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ABSTRACT

Social, technological, and economic factors relevant to informed decision-making are presented to provide policymakers with an understanding of factors involved in national entry into videotex and/or teletext technologies. It is assumed that the policymaker has a basic knowledge of computers, but little or no knowledge of the videotex-related technologies is required to use this guide. Costs of implementation and use--as well as infrastructural requirements--are given wherever possible. The technologies are introduced, and principles of operation and terminology are presented, including elements involved in a public videotex service and the stages in the development of such services. Socioeconomic factors, including cost/benefits and policy options, are considered, and a comprehensive list of public videotex services worldwide is provided. Four appendices include: (1) home and business applications of videotex and teletext services; (2) videotex standards; (3) references; and (4) a glossary. (KM)

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A Decision maker's guide to videotex and teletext

(preliminary edition)

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A DECISION MAKER'S GUIDE TO VIDEOTEX AND TELETEXT

(preliminary edition)

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Preface

The General Information Programme (PGI), established in 1976, is designed to provide a focus for Unesco's activities in specialized information, documentation, libraries and archives. It includes activities undertaken within the framework of UNISIST comprising internationally developed methods, norms, standards, principles and guidelines governing the processing and transfer of information, particularly through the use of modern computer and telecommunication technologies and their application to the development of compatible information systems. PGI also aims at strengthening national capabilities for handling and accessing information by providing guidance and technical assistance to Member States especially the developing countries for establishing their national information infrastructures including information policies and specialized information manpower. The present guide, prepared for Unesco under a contract by the Interdisciplinary Center for Technological Analysis and Forecasting at Tel Aviv University, is based on research funded by the Israeli Ministry of Telecommunications for the purpose of formulating national videotex, teletext and cable TV policy.

The guide attempts to provide decision makers with an understanding of the social, technological and economic factors relevant to informed decision making regarding national entry into videotex and/or teletext technologies. It is meant as a first review of such systems so that national level policy makers with little or no prior related knowledge can effectively evaluate the socio-cultural needs as related to the infrastructural and economic capabilities of their respective countries. Developing countries and small countries with limited resources are particularly concerned with their ability to utilize new information technologies. Therefore, wherever possible, costs of implementation and use as well as infrastructural requirements (for example, telecommunications and manpower) are given. The type of information to be carried on the system has not been stressed only because the breadth of information is so large and so varied from science and technology to sports and weather. Experience has shown, however, that the business community is the most willing customer for pay services and that the information carried generally reflects this fact. The guide also includes brief notes on videotex and teletext developments in several countries of the world, appendices giving examples of types of application and a glossary of selected technical terms.

At various stages in the preparation of the guide the authors have received advice and comments on the work and have benefitted in particular from those given by Istvan Sebestyen, Siemens AG, München, Graham Jones, British Telecom, Prestel, London, and Rolland Haber, Euronet/DIANE, Luxembourg.

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Objectives of this Guide

Technology assessment can be viewed as a process of examining policy options and the methods necessary to capture the benefits of technology. This task is executed while monitoring and controlling the technology's potentially harmful side effects.

The purpose of this guide is to aid potential Videotex service operators in identifying the relevant policy options which they will confront. Furthermore, this guide will provide specific insights into various factors which should be taken into consideration before any practical course of action is chosen.

This guide is addressed to those who may be faced with some aspect of Videotex and/or Teletext planning and management. It is assumed that the reader has a basic knowledge of computers, but little or none in the Videotex-related technologies.

Organization of this Guide

This guide is designed to lead the reader in an orderly fashion through the information required in order to gain an understanding of the Videotex technology and the components required to operate a public Videotex service such that informed decisions can be made.

This guide is made up of five chapters and appendices:

Chapter 1 - Introduces the reader to the two technologies under the umbrella term "Videotex": Viewdata or interactive Videotex, and, Teletext or broadcast Videotex. The reader will gain an understanding of the principles of operation as well as the terminology.

Chapter 2 - Describes the elements involved in a public Videotex service. These include the participants, their contribution and responsibility, and the facilities offered in public Videotex systems.

Chapter 3 - Describes the stages required in developing the Videotex service from the trial objectives to the public service.

Chapter 4 - Describes the socioeconomic factors involved in establishing Teletex and Videotex services. Costs and benefits for the service provider, information provider and user are discussed. Policy options and economic considerations are presented.

Chapter 5 - Details a comprehensive list of public Videotex services worldwide.

1. Videotex Technologies

1.1 Introduction

Recent developments in microelectronics, information processing and telecommunications and the demand for personal information services paved the way for the provision of a wide range of services to be used in home, office, school, etc. Most of these services can be provided by upgrading facilities already existing in many business premises, schools and homes such as personal computers, computer terminals, telephones and television sets.

One of the most dramatic developments in information provision in recent years is a technology that enables the dissemination of textual and graphic information by wholly electronic means, for visual display using a PC monitor or on an adapted home television receiver, under the control of the user. The generic term for the variety of information services provided is **Videotex**, including both one-way information services and two-way services. The term **Teletext** is used to describe one-way broadcast information services for displaying pages of text and pictorial material on the screens of adapted TV sets.

Another new medium that may provide easy access to large amounts of stored verbal and pictorial information is the laser videodisc. The videodisc might complement the Videotex system in the home as an interactive standalone system for random access to full-text, pictorial information or full-motion video. Also the videodisc, due to its capability to store massive information in digital form, may also be used by information providers to Videotex systems.

Furthermore, the home information system might be enhanced in the future into a two-way interactive video communication system. By replacing the telephone line with an optical fiber connection and adding a microphone and a camera to the keyboard and TV set already available at the subscriber's premises, an additional variety of services can be provided.

In the following paragraphs, we will explore in depth the two technologies, Videotex and Teletext. Upon completion of this chapter the reader should have gained an understanding of the principles of both operation and terminology.

1.2 Teletext

With a home information system that has originally been developed in Europe, television viewers need not wait for scheduled news to see the weather forecast, the latest sports scores or stock market prices. The system, originally designed for captioning for the hearing impaired, is today generally controlled by TV networks and uses the VHF and UHF bands to transmit data to the home television receiver. Called Teletext, the service allows subscribers to view the data at any time.

In the Teletext **broadcast** data system (Figure 1-1), the information to be transmitted is assembled in a data base, by the service provider. The information, which may be news, sports results, weather information, financial data or consumer reports, is formatted into numbered pages of text and graphic representations enhanced by colour. These pages are then coded in binary digital form and are broadcast cyclically over the regular television network, in a fashion similar to that of the carousel.

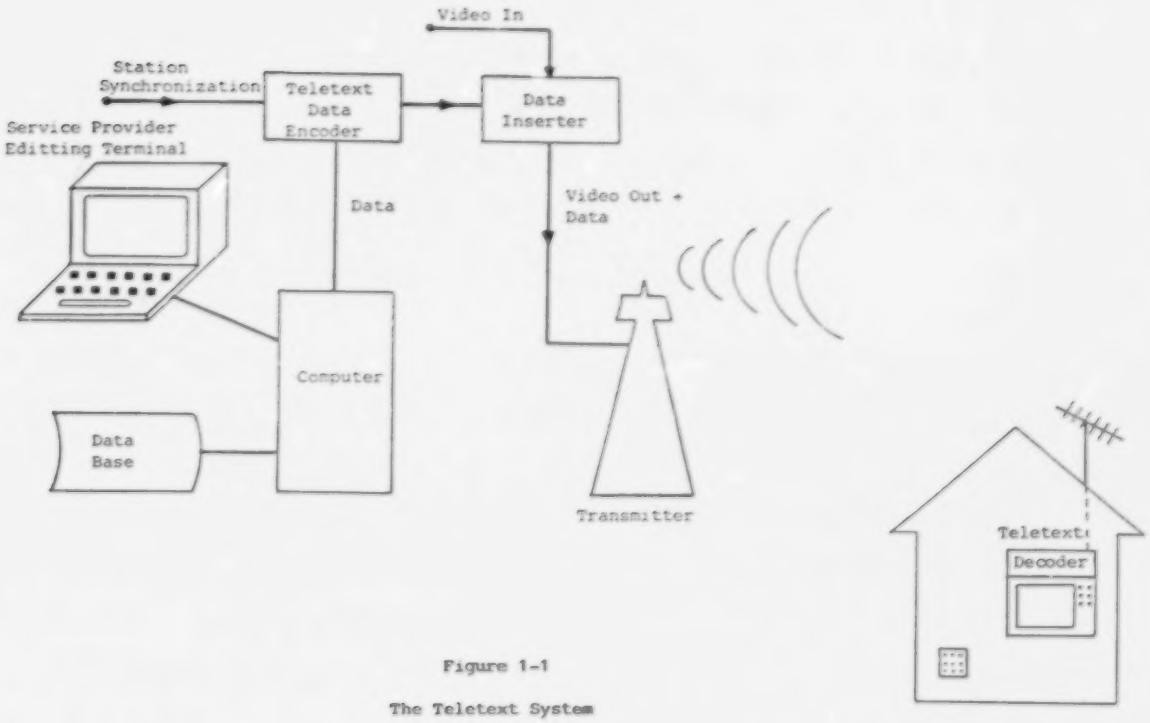


Figure 1-1

The Teletext System

The encoded Teletext data is inserted or multiplexed onto a video signal and transmitted with the TV signal on unused lines in the vertical blanking interval. This is the period in which the electron beam, which is responsible for depositing the picture on the television screen, returns to the top of the screen in order generate the next picture. Physically, these lines are located at the uppermost part of the television screen and are not visible to the viewing audience.

Most television stations have about 25 lines available for Teletext broadcast, although the most popular Teletext services in Europe use no more than 4 lines. On the average, using one available line, 2 pages of information are broadcast per second; using two lines, 4 pages per second; using four lines, 8 pages per second. etc. Hence, assuming that 160 pages are transmitted over 4 vertical blanking interval lines, the average waiting time would be 10 seconds, and 20 seconds in the worst case. The European Teletext page is made up of 960 characters per page (24 rows of 40 characters each). This proposed European standard is being disputed in the U.S., given that the U.S. scan-line raster television system has only 525 lines compared to the 625 in Europe. Recent evidence shows that 24 rows do not reduce quality on the U.S. system, so it seems that the 40 X 24 page format may be universally accepted.

The pages are organized in magazines. Usually each magazine represents a specific type of information (e.g., news, entertainment, education etc.) with up to 100 pages per magazine. The magazines are then transmitted, but, not necessarily in any particular order. Each page is transmitted sequentially until all the pages have been broadcast, then the first page is again transmitted and the sequence starts over again. The format of the transmission is similar to that of the carousel. The first line of every page--termed the page header--may incorporate special information identifying the page number, the name of the service, and the date and time of day. Indexed pages, indicating the page numbers of specific information, are usually broadcast at a frequency higher than information pages.

At the receiver end, the viewer, equipped with a special decoder which is either a separate accessory to the colour TV or an integral part of the TV, keys in the desired page number. He uses a simple numerical keypad that is usually combined with the receiver's remote-control unit. Special receiver circuitry is used to inspect the page header information, identify the page, and store the data.

While it appears that the viewer must wait for one complete carousel transmission before the information shows on the screen, in practice, the average delay is half that time. First, not all 24 lines are transmitted for a less-than-full page; this shortens the average transmission time per page. Second, since each page is individually identified, the pages can be transmitted out of sequence. Pages of special interest or importance - such as the index page for the magazine or topical news - can be inserted more than once in a given pass to assure faster access to them.

Most significantly, additional pages of memory can be installed in the receiver at little cost. This allows pages on preferred topics to be available for viewing within the first few seconds after the receiver is switched on. Therefore, these pages are available on demand or updated, as necessary, from the ongoing transmission.

In addition to being piggybacked on a conventional broadcast signal, Teletext can be transmitted on a full-channel basis, either over the air or via cable. An entire broadcast channel can be devoted to Teletext information on a full or part-time basis. By transmitting Teletext alone without the accompaniment of a regular broadcast signal, the operator can use all the lines on the screen to receive the signal and can thereby include thousands more pages of data with the service.

Apart from the normal display of alpha and numeric text symbols the Teletext specification also provides for an elementary form of graphics display. This facility can be used for presenting simple diagrams, such as a weather map. The graphic mode may also be used to produce extra large text characters such as those used for page titles. It is also possible, by using the graphics mode to display quite effective pictures.

One of the more attractive features of the Teletext system is the ability to display the information, either graphic or text, in a range of different colours. A standard colour receiver uses a colour picture tube having three separate electron guns; one each for red, green, and blue. By selectively switching the video drives to these three guns all of the colours required for a colour picture are achieved by allocating one bit of a control code to each of the primary colours red, green, and blue. These bits are used to switch the dot pattern drives to the red, green and blue guns of the picture tube to produce the various display colours.

The Teletext system also incorporates a number of other options which can control the display format or increase the total number of different pages of information that can be directly addressed by the viewer. One of these options is that of providing subtitles for some viewers without interfering with the normal programmed picture. One approach which is used for presenting subtitles for the deaf is to blank off a strip of the picture area at the bottom of the screen and to insert the subtitles or translations into the blank space that is produced. This process is also used for presenting newsflash pages. The blanked out areas are called "boxes" and the display mode is called boxed display. It is possible to have the decoder select the boxed mode automatically for this type of page. Newsflashes will be left on the screen and the screen will be cleared of text by pressing a command button of the decoder. If the information presented on the newsflash is changed the new text will be displayed immediately.

Both Teletext and Videotex services can be provided via wideband cable networks. Cable Teletext based on a single TV channel (i.e. utilizing a 6MHz band out of the available range of ca 300 MHz) has the advantage over blanking interval broadcasting of higher page capacity and faster access time. As in the case of full-channel Teletext transmission the cable system is capable of delivering up to 10 thousand pages with an acceptable access time.

In summary, the factors affecting the access time of Teletext pages are:

1. The number of television lines dedicated to Teletext transmission. The more TV lines available, the faster the access time to any particular piece of information.

2. The number of pages being transmitted on any carousel. The greater the number of pages, the slower the access time.

3. The digital bit rate of data transmission. If the bit (or baud) rate is very high then data transmission will be very fast, but the error rate will also increase. If the bit rate is very low, then data transmission will be slower, but the error rate will decrease.

4. The larger the decoder memory the shorter the access time since more pages may be stored internally. Intelligent decoders can be programmed to record the most viewed pages. Upon the first pass of the carousel, all these pages will be stored within the decoder.

1.3 Videotex

The Interactive Videotex system (also known as Viewdata and heretofore referred to as Videotex) differs from Teletext in two essential ways: It is transmitted over a cable network - either two or four wire telephone lines or two-way coaxial cable television lines - and it is interactive.

The basic components of a Videotex system (see Figure 1-2) are:

- A modified television set, personal computer or Videotex terminal, to receive and display the information, with a keyboard used to select the required information. The receiver set can be fully integrated with the decoder, modem, auto-dialer and terminal identifier. External adaptors can be used to plug into existing TV sets. The same set or adaptor can be used for both Videotex and Teletext. In a business environment, small screen desk-top sets or microcomputers may be used.

- The ordinary household or office telephone line, used to link the user with the database. In some systems, two-way multipurpose cable-TV lines may be used for the connection to the database.

- A service centre with a local database or a network of service centres and databases. At the computerized service centre a number of administration and control functions are carried out:

  - validating subscriber, password, and closed-user group numbers;
  - storing test pages, messages, control and usage statistics, and accounting and billing data;
  - maintaining lists of subjects and high-level indexes.

A local database may store detailed indexing and information pages. Alternatively, the database may be remote, with the service centre acting as a gateway or switching point to the remote database, of which there may be more than one.

- The information providers, supplying updated or fresh information into the database directly from their own offices, using an editing terminal with remote access. Some of the organizations charge the user for each page of information accessed and some provide their information free of charge.

Videotex Via Telephone Line

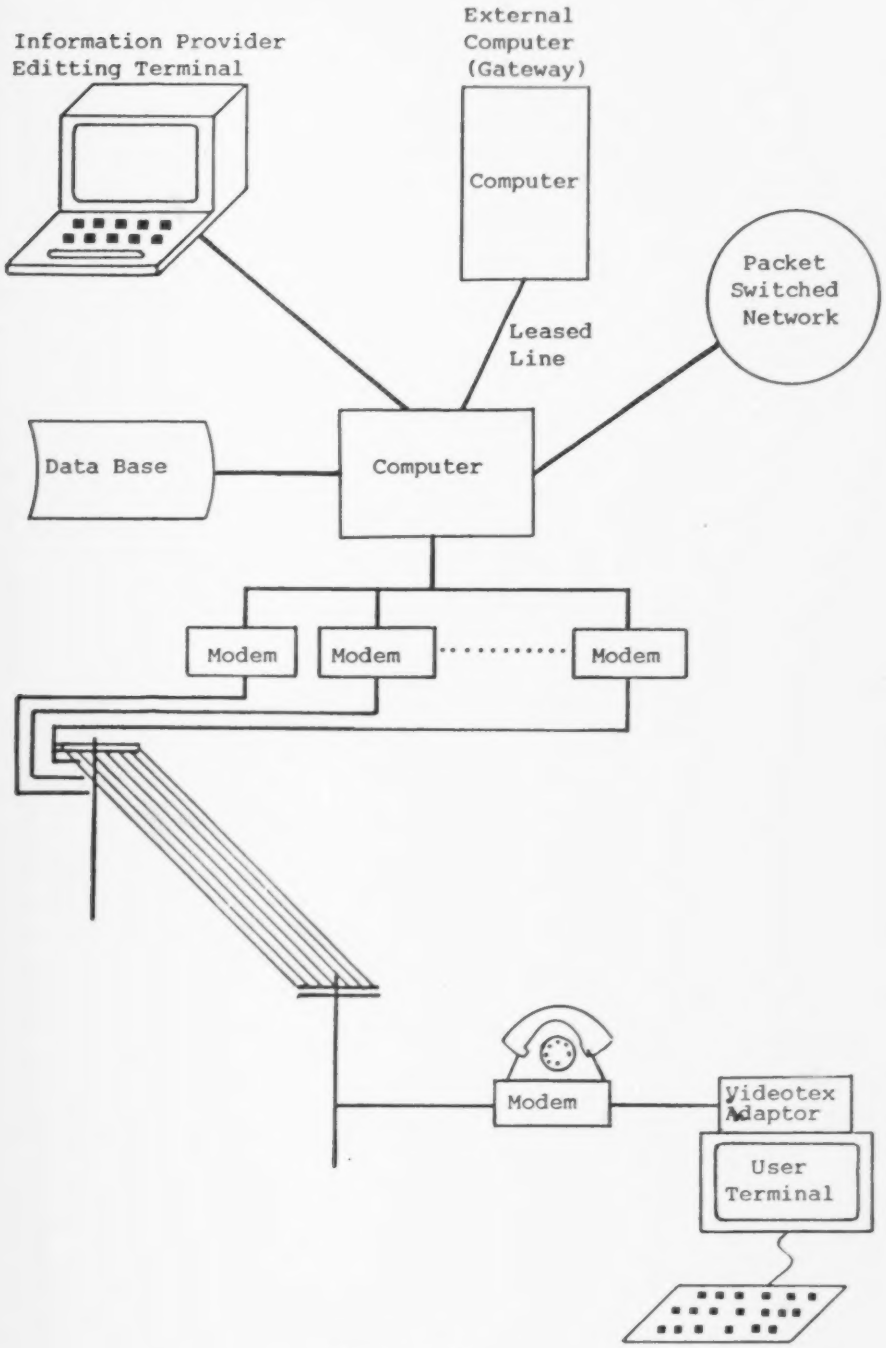


Figure 1-2

The Videotex System

The most appropriate transmission medium to connect users with service centres is the public switched telephone network (PSTN). Local communications between subscribers and exchanges are, with few exceptions, through copper wires designed for analogue signals at a bandwidth of roughly 4 KiloHertz, but these lines can also carry the digital signals needed for Videotex.

Most Videotex services developed in the past were designed for transmission speeds between service centres and users of 1200 bits per second, using short haul (and low cost) modems. The speed of transmission in the reverse direction is usually 75 bits per second, enough for a keying rate of about seven characters per second.

At turn-on the Videotex terminal in a system using the switched telephone network, the initial telephone call to the service centre is made automatically by the receiver. When computer contact is acknowledged, the viewer keys in a code to use the system and initiate the billing procedure. Subsequently, a broad index of subjects appears on the screen. The viewer keys in the desired page number, and that page alone is sent to the receiver. Each character is represented by a 10-bit word: seven bits define the character coding, a parity check is included and start-and-stop bits identify each character. Thus, a full page of 960 characters is sent from the database to the home receiver at 1200 bits per second, in exactly 8 seconds. This rate is adequate because the system begins transmitting instantaneously upon request and the characters are written faster than most people can read. This can be seen for example in languages not generally written from left-to-right such as Hebrew or Arabic.

A typical Videotex system will contain many thousands of information pages and the goal is to provide a means of data access which is quick, cheap and easy to use. The key to effective information retrieval is the indexing method. The method most widely associated with Videotex is a menu consisting of indexing with numbered choices. In this method, each page is uniquely numbered and the menus are arranged in a hierarchy of increasing detail. A user works through them by signifying the selection of a numbered choice through the corresponding numbered key on a keypad. The menu looks like the inverted branches of a tree and therefore this arrangement is often called a tree structure.

Since each page of a Videotex base is assigned a number, an alternative selection method is available in which the page is selected directly by use of additional commands. These access pages are stored and referenced by a directory.

The selection of known pages is not considered interactive. However, Videotex users have (at least in theory) the power of a large computer at their disposal. Users are potentially able to execute complicated communications and transactions from home or office terminals. Electronic banking, home shopping, bill paying, and sophisticated videogames are only some of the interactive services that exist. Furthermore, because the text, graphic, and control coding is stored in the head-end of the host computer, Videotex page capacity is limited only by the storage capacity of the host. Due to the two-way capability of Videotex, in-home hardware must necessarily be more sophisticated and expensive. A more sophisticated terminal might include input devices such as a typewriter keyboard and microprocessors to allow for the processing of user input.
One exciting aspect of interactive services is that some of them will be provided through a gateway switch to the actual institution involved. For instance, if a user wants to conduct an electronic banking transaction, he will call up the service and the computer will automatically reroute him to the on-line central computer at the bank with which the user will conduct his business. This capability dramatically expands the scope and power of a Videotex system.

Although two-way equipped cable lines are a superior transmission medium in areas where two-way cable service is available, and could eventually emerge as the dominant medium for Videotex, telephone lines seem to be the medium most likely to be used for large data-based two-way Videotex for the foreseeable future.

The various applications suitable for implementation on a Videotex service can stretch one's imagination. Due to the ability to reach new markets, unheard of in previous technologies, with colour graphics and interactive service, many traditional data applications and many new and novel ones are being evidenced wherever Videotex services are offered on a national basis. Appendix A lists just a few of the possible applications suitable for a Videotex in both the business and residential environments.

2. The Videotex Service Framework

2.1 The Participants

2.1.1 Service Operator:

Service Operators are organizations responsible for the quality of the Videotex service and its management. Some PTT administrations prefer to directly supervise Videotex services along with the technical responsibility the PTT normally carries. Others transfer the authority to operate Videotex services to specially established public or private companies.

It is the service operator's responsibility to produce the facilities whereby a public Videotex service may operate nationwide. To ensure this, one or more computer centres may be required throughout the country. These centres may replicate, either in whole or in part, the central data base, or they may merely act as switching centres to the central computer.

The central computer may hold the entire Videotex data base; it may act as a switching centre to independent external computers or a combination of both. It is the centre's responsibility to maintain customer records, record computer usage, do billing and accounting, service customer requests and maintain a reliable available service. It is also the centres responsibility to maintain the interface between the subscriber's Videotex terminal and the information he requests on the data base whether the information he requests is on one of the centre's computers or on an external computer.

British Telecom's Prestel has opted to create computer centres throughout the UK with replicated data bases. These computers handle the heavy load in their region and also act as backup should any of the other computers fail. Both Germany and France have adopted the distributed data base philosophy whereby the computer centres act as switching centres and record usage and perform accounting. The German system allows for local data base storage on the system operator's computer. The French Teletel merely switches the users to remote data bases. The information providers are responsible for billing and data base access.

Whichever option is adopted, both the service operator and the external gateway computer operator must determine the number of users that it can simultaneously accommodate. Should the computer be too small, the users may suffer frustratingly long response times or may not be able to access the computer if it is serving to it's capacity. If the computer is too large, the users will be satisfied with the response time and service, but the overhead costs may be too high.

2.1.2 Network Provider:

In most countries, the Videotex system operator is the national PTT. This combination is often both convenient and practical. Since it is the PTT's responsibility to maintain the national telephone network as well as to improve service, Videotex becomes a natural ally for not only does it bring increased revenue due to greater usage of the existing telephone network but it also positions the PTT for future developments as the demand for information retrieval grows both in the business and home communities.

It is the network provider's responsibility to maintain the public switched telephone network, permitting users of the public Videotex service to communicate with the service centres, and to provide the infrastructure whereby all the Videotex service centre computers and all participating external computers communicate with each other at high speed, throughout the country.

The quality of the public switched telephone network must be determined. Line noise will determine which error detection method should be implemented when errors occur, and, what is the optimum speed at which the user terminals can communicate with the computer. PSTN traffic will determine which exchanges will probably be overloaded due to the additional Videotex traffic on the network. As a result of these two factors, old exchanges may have to be replaced by newer more efficient ones, and, new exchanges may have to be installed in order to support the additional traffic.

Initially, Prestel created a computer network completely dedicated to Videotex (see Figure 2-1). Computer centres were established in the major regions across the UK and these computers were inter-connected by high speed, dedicated lines. Customers would call the local Prestel number, and since most of the available data bases were replicated the user received what he need locally. Should the user request information from an external computer, the Videotex host would then switch the user to the target computer.

Recently, however, the British have adopted the network philosophy already successfuly implemented by the French and Germans (see Figures 2-2 and 2-3). Their network philosophy is based on the national packet switching network (PSN). Users of the Videotex system call service centre access points at the local call rate. The service centre may or may not have computers at the site. If it does, then this computer will have its data base. This data base may be a full or partial replication of the master data base. In all cases, the computer maintains full network menus and indexes.

Should a service centre computer not exist or should the requested information reside on another computer, the national packet switched network will route the request to the target computer which will then handle the request. Independent computers permitting Videotex access must be recognized as a node on the PSN. Using the PSN allows distance-independent tariffs allowing users to access any data base without incurring additional communication charges.

Each country must determine its capability to offer a comprehensive Videotex service. If the present telephone installations are backlogged, or if the exchanges are used to capacity, comprehensive service cannot be provided and alternate means of data transportation must be found.

Videotex Network Architectures

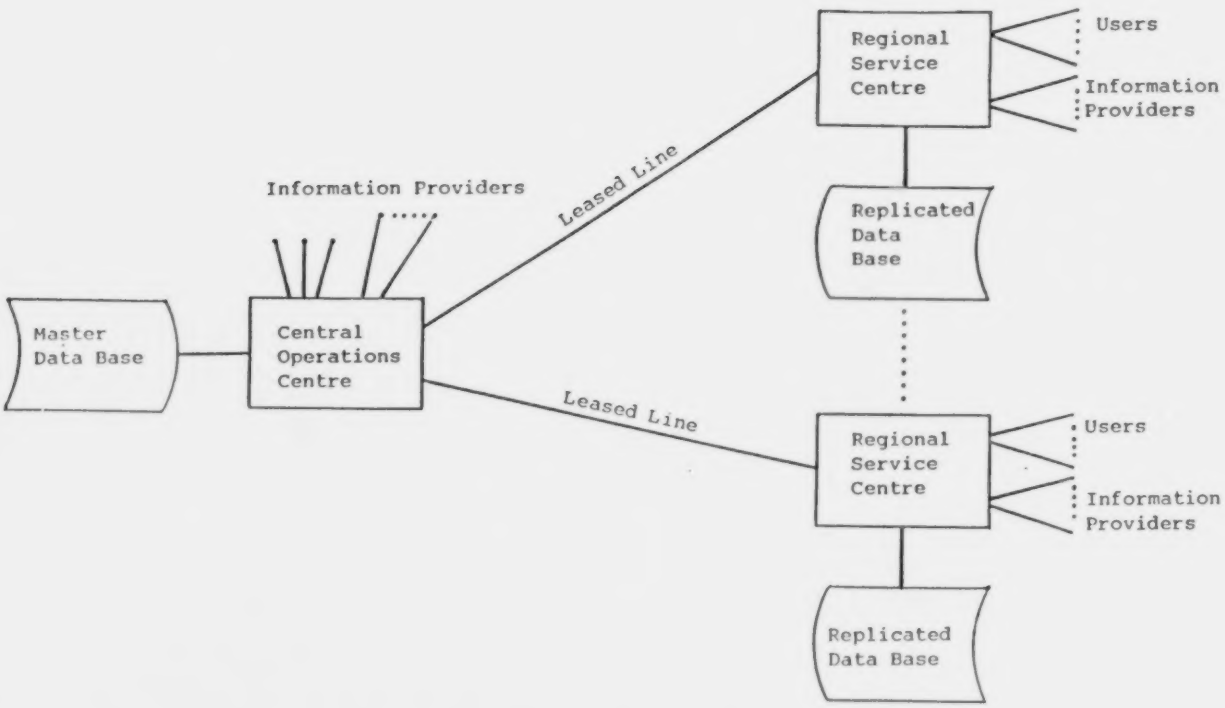


Fig. 2-1

Network Structure for

U.K. Prestel Videotex System

Videotex Network Architecture

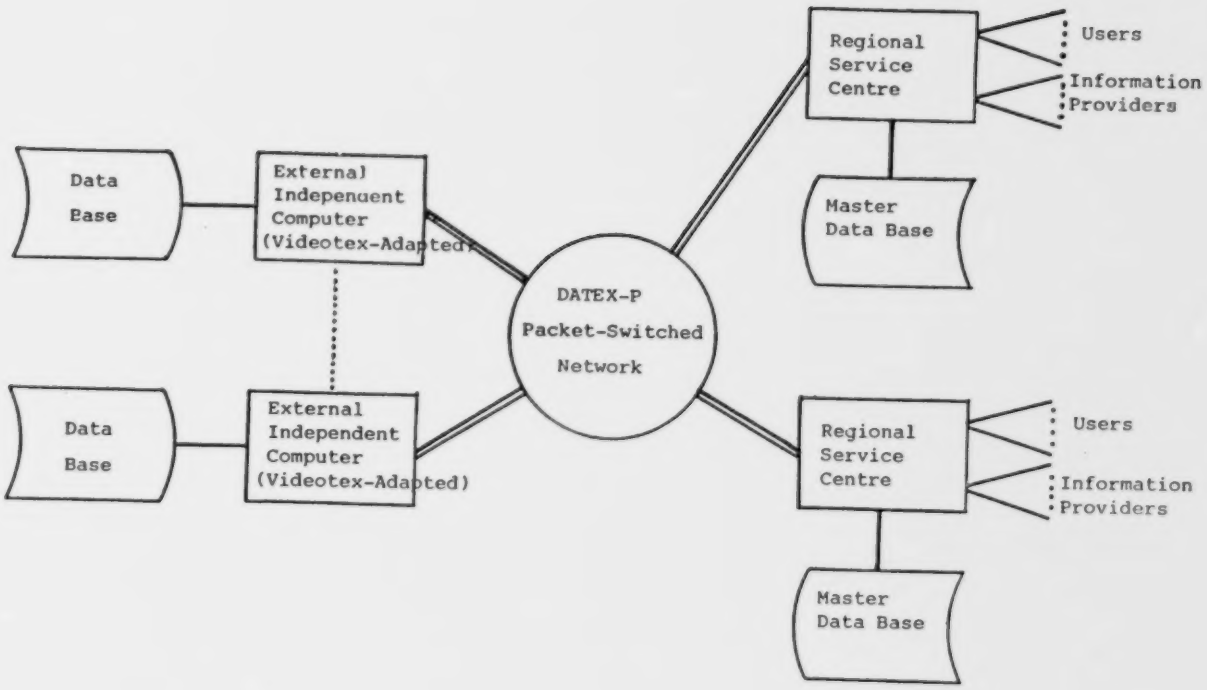


Fig. 2-2

Network Structure for
West German Bildschirmtex
Videotex System

Videotex Network Architecture

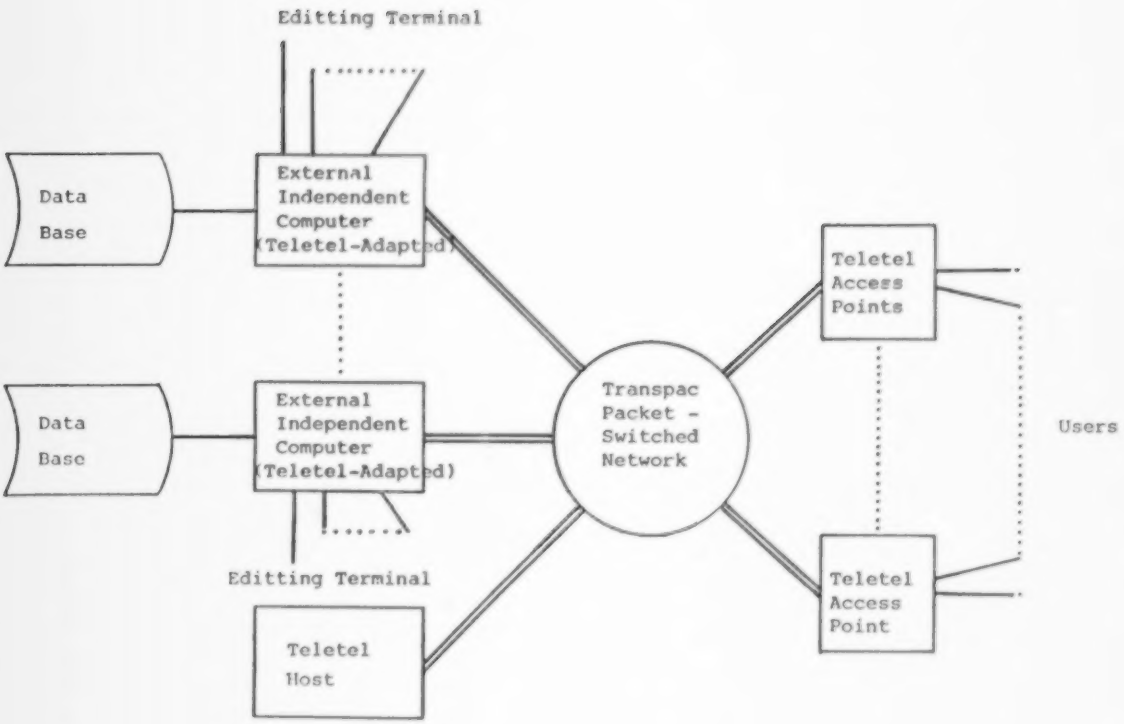


Fig. 2-3
Network Structure for
French Teletel Videotex System

2.1.3 Data Base Producer

Data base production, means the design, creation, maintenance and updating of databases by the information industry.

Information may take the form of volatile information such as financial statements, schedules, stock exchange, etc. or non-updating information such as encyclopedias, educational courses, published information, etc. Those bodies responsible for making their data base available to Videotex users are called information providers.

In all existing Videotex systems, the PTTs themselves have restricted their capacity of data base production to the creation of electronic telephone directory and service menu creation and maintenance.

Information Providers operate computer-based video creation systems which are designed to create, edit, store and transmit digitized images. The digitized images (frames) are either locally stored in the corporate computer system or they are transmitted to the Videotex centre of a public Videotex network. The frames are individually addressable and accessable by means of the public switched telephone network, switched data network or local data communication networks. According to the nature of the information offered to the user, the information provider has the option to either collect a per frame charge or deliver his service free of charge.

2.1.4 Terminal Supplier

In order for any Videotex service to succeed, the revenue generated from the subscribers must justify the operation. That is, the larger the user community, the greater the income. Therefore, the cost of Videotex equipment must not be prohibitively high.

Several options exist to supply the user community with terminals:

1. Modified Televisions:

   If the country contemplating a Videotex service has its own television manufacturing industry, it may be feasible to design the televisions such that with relative ease, Videotex cards may be attached. The benefit of this method is the low additional cost to upgrade standard TVs to Videotex terminals and support for an industry satisfying the country's own needs.

This strategy is feasible only if it is government policy to promote new TV purchases and if a large proportion of the population are in need and are capable of purchasing a new TV. It should be noted that the modified TV is intended for the home market and not for the business community.

2. Personal Computers:

Due to the rapid drop in the cost of personal computers, more and more are finding their way into businesses and homes. All that is required to enable personal computers to communicate with a Videotex service is the appropriate software and/or interface card and a modem. This is by far the least expensive solution provided the user has in his possession a personal computer. Furthermore, with a personal computer, the user can also enjoy the benefits of telesoftware. Local industry may also benefit from the developing and marketing of software packages capable of transforming a personal computer into a Videotex terminal supporing national languages and advanced features.
In the United States and Great Britain, personal computers have added significantly to the credibility of Videotex.

3. Dedicated Videotex Terminals:

Dedicated Videotex terminals include a display screen, full alphanumeric keyboard and auto-dial modem. The screen may be colour or black & white as well as variable in size. Intended primarily for business users, the French model (described in section 5.1.2) is the best example of mass marketing together with cost justification. In the final analysis, it was cheaper to distribute Minitel Videotex terminals free of charge to homes requiring directory assistance than it was to distribute the entire French telephone directory.

Should a decision be made to subsidize the cost of user terminals, terminals like the Minitel is probably a good solution due to its low cost and good quality. It is portable, small and does not interfere with television viewing. Should the decision be made to distribute teminals, it is advised to compare the large purchase of Minitels or similar Videotex terminals, with local manufacture or mass production.

2.1.5 The User

How much the market is willing to spend on Videotex services depends on the need for the information as well as its quality, immediacy and cost.

The information needs of the residential community are presently fulfilled by radio, television, newspapers, periodicals, journals, directories and books. For this community to divert part of its spending toward Videotex, the information itself must be attractive and organized in a fashion which is at least as acceptable as current information-acquisition methods and either equally or perhaps slightly more costly.

The business community differs from the residential community in its willingness to pay for timely, meaningful information. The business user can easily compare the quality and cost benefits of Videotex services as compared to present methods of information collection. Furthermore, business information requirements can be determined with greater ease than those of the residential community. It is the fulfilling of their needs with a service at a cost that is acceptable that must be achieved.

Both the residential and business user expect the Videotex service to be easy to use and understand, regardless of the number of services offered to them. The response time between the time the user requests specific information and the appearance of this information on his screen must be minimal, otherwise he will be frustrated by the service. And finally, his use must be justified by his budget.

2.2 Videotex Facilities

2.2.1 Security

Once a user has, via his terminal, contacted the Videotex service computer, he will be asked to identify himself. User identification requires him to enter his user number, supplied to him by the service operator, and a secret password. The secret password which may be variable in length can be any alphanumeric combination. Naturally, the password is not echoed back to the user terminal and may be changed by the user at any time.

Multiple levels of security may exist and at any level of information retrieval. For instance, a user might request specific information such as a bank statement which only a limited group of users are eligible to access. Although he has previously signed on with his system password, he will be requested to further identify himself by means of his bank account number and another secret code. Hence, many levels of security may exist during any session.

2.2.2 Information Retrieval

The path which any user takes in order to retrieve the information he requires will vary according to the facilities offered by the Videotex service. Menu driven retrieval (see Figure 2-4) is a method offered in all Videotex serivces. It is both easy to understand and easy to operate. Little or no guesswork is required to reach the required information. Direct page access is another method of reaching the information, however, one must know on which page the information resides.

Finally, some service providers enable their subscribers to access requested information by means of keywords. This method requires greater knowledge of search techniques by the subscriber as well as greater computing power by the service provider. However, as the user becomes more sophisticated with Videotex and other information services, the generaly demands more sophisticated retrieval techniques; keyword searching answers most demands.

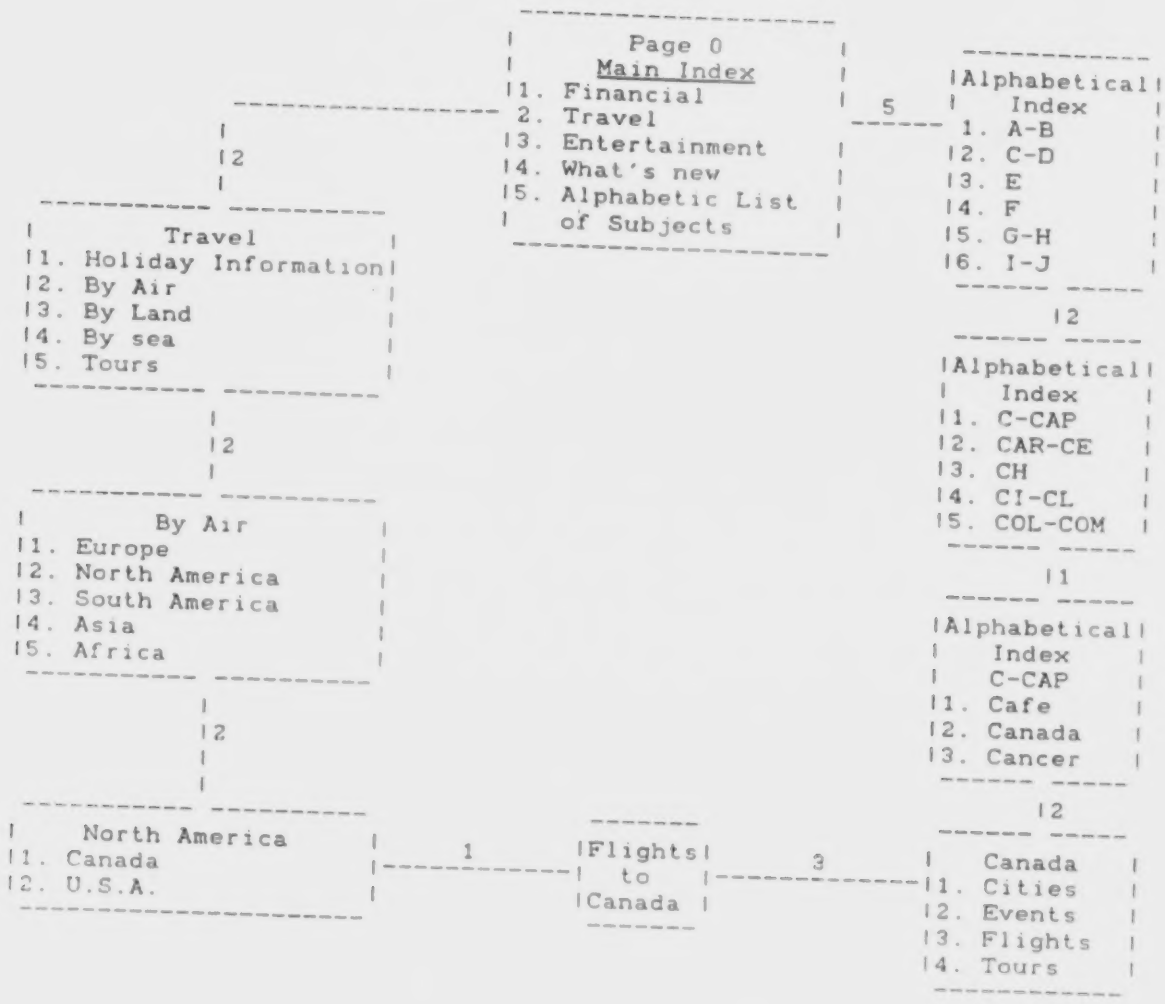


Fig. 2-4

Tree Structure Method of Information Retrieval

I - Terminals and Modems:

Should the PTT be responsible for terminal and modem sales or rental, revenue can be generated from these sources. The German PTT is the sole distributor of modems for Bildschirmtext and hence monopolizes modem rental. The French PTT distributes Minitel terminals free of charge to its residential telephone subscribers and charges businesses for them. Monthly maintenance charges are alloted and are part of the billing.

J - Electronic Mail:

Aside from the connect time realized during letter editing, subscribers are also charged for mail delivery, storage, Telex service and international electronic mail services.

2.2.3 Closed User Group

Sections of the Videotex data base may be made available only to a specific community of users or Closed User Groups. These special purpose data bases may be accessed only by registering with the body reponsible for the information. Access to these data bases may occur directly once the subscriber has been registered as a member of the closed user group (CUG) or by entering a member password when requested by the Videotex service.

2.2.4 Message Service

As the user community grows, the need for individual users to communicate with other users becomes more important.

Message services exist in which a user can fill in pre-defined forms made available by organizations for the purpose either requesting or obtaining information from the organizations. Also, users can write letters in free format text and send them to other users or organizations.

Some Videotex operators provide sophisticated electronic mail services with the ability to send mail to distribution lists, file letters on the Videotex computer, maintain letter follow-up facilities, telex facilities and international E-mail capabilities.

2.2.5 Computation

Response pages (pages in which the user is required to fill in special non-protected fields) may have computer programmes associated with them which will accept the data entered by the user and perform sophisticated calculations upon them and then return the results to the user.

2.2.6 Telesoftware

A mechanism has been created whereby computer programmes may reside on Videotex pages (according to pre-defined specifications). A microcomputer user communicating with the Videotex service may access the first page of the programme he wishes to obtain and then initiate the "downloading" programme on his computer which will then "read" each Videotex page of the programme, reconstruct it according to pre-defined conventions until the entire programme has been acquired from the Videotex computer. The user may then disconnect from the Videotex service and run the programme locally on his microcomputer.

2.2.7 Gateway

The connection enabling a user to interact with a Videotex data base located on a computer other than the one which he logged onto is called a gateway. A gateway permits many organizations whose information is of user value to connect to the Videotex network with little or no overhead to the host Videotex computers. Most of the major computer manufacturers market Videotex "front end" software enabling existing applications to be accessed via Videotex gateways. Gateways are the basis of the German Bildschirmtext network and the French Teletel Videotex system.

2.2.8 External Computer

Organizations which wish to enable Videotex subscribers to access their data base or applications, but for one reason or another choose not to implement the Videotex gateway may still connect to Videotex hosts. By means of response frames and user exits (computation), users transact with the Videotex host, which then passes the fields to the external computer in a fashion acceptable to it. Upon acting on the data received by the Videotex computer, the external computer sends its data to the Videotex computer who displays it to the user.

2.2.9 Accounting

Most Videotex systems include an accounting system. From the moment any user successfully logs on to the service computer, a detailed audit trail is maintained. The time of logon and logoff, which pages he views including frame charges, which response frames, electronic mail usage and storage, computation services, and gateways are all recorded and stored for further use. Some systems permit on-line billing such that a user, at any time may view his accummulated bill to date.

3. Implementing Public Service Videotex

The experience gained by National PTT Administrations in the operation of different Videotex network shows that the majority of systems installed so far serve business-corporate applications and are based on existing computers and terminals within the organization. Initial system implementation of Prestel, for example, resulted in 85% business users. The obvious reason for this phenomenon is economic. When you utilize existing equipment, cost justifying Videotex is not difficult. There are little or no training costs to factor in. Due to its simplicity, it costs far less to create and maintain a Videotex infobase than it does to create and maintain a traditional database. And it is certainly no more expensive to prepare a Videotex page than it is to set type and paste-up a page of material for the printer. Furthermore, business users are better trained to expect to pay for information they receive while residential users expect to pay either nothing or a modest fee (e.g. price of a newspaper).

3.1 Pilot Trial

If Videotex has not been previously tested in the public sector it will be necessary to conduct a pilot trial to ensure the technical feasibility of all the Videotex components (computer facilities, communications network, including telephone, terminal/modem test, Videotex access points, etc.).

To conduct the trial and evaluate its results, an executive committee should be created. It will be the duty of the committee (1) to evaluate the components, (2) to design the data base structure with built-in expandability for upgrading to the market trial and to public service, (3) to test user equipment for functionality, availability, and national language requirements, and (4) to determine which regions may have difficulty in receiving Videotex.

3.2 Market trial

Once the pilot trial has been successfully completed it is recommended that a limited duration market trial be conducted. This period is critical in determining the scope of potential services which will be offered. As much hindsight must be gained from the experience of existing national Videotex systems to determine which data base structure and services best suits the immediate and future requirements.

The PTT must exhibit a commitment to the creation of national Videotex network in order to stimulate interest, cooperation and then commitment from potential IPs, terminal manufacturers and user communities. Thus, communication networks will have to be increased to permit various regions to participate in the trial as well as to determine which network structure best satisfies present and future growth patterns.

Comparison of a dedicated Videotex network similar to the original Prestel network or the addition of Videotex to the national packet-switched network (Germany and France) will have to be decided at this time to permit an easy transition when public Videotex is announced. Network growth should be forecast.

The telephone network will have to be monitored to prevent overloading at any exchange as well as to ensure reception at remote regions. The market trial must also determine the information requirements of the user community, and its willingness to pay for the information.

For successful marketing of any Videotex service both the computer centres and the user community must grow together. The population of personal computers must be determined, and appropriate software and hardware must be supplied to this community to permit them access.

Involving television manufacturers, computer terminal manufacturers, and personal computer manufacturers in the planning and implementation of the market trial at the earliest stages will permit them to evaluate their particular target market and prepare in advance to satisfy growing requirements.

3.3 Public Service

Once it has been decided to provide a public Videotex service, the scope of the service should be published to create an atmosphere within both the residential and business communities conducive to project success. As each milestone is passed (i.e. service to additional regions within the country, and new services released) publicity campaigns should be initiated. For example, a marketing campaign will be necessary to convince potential IP's that the public service Videotex is cost/effective, opens channels to untapped markets, is long term, is attractively packaged, relatively easy to implement, etc.

Information providers will come to the Videotex operator to discuss the advantages of promoting their product through the national service, but, not at first. Public awareness is an absolute first necessity such that any decision to acquire computer or television equipment will be based upon the ability to participate in the Videotex service. This campaign should be carried out by using all the media available i.e. TV, radio, newspapers, etc.

It is anticipated that initially, it will be the business community that will show the greatest interest in the public service. Computerized corporations with the need to further serve their sales force, clients, and agents with information can see immediate benefits from Videotex.

However, to maintain the balance between business and residential needs, marketing strategies must be developed to serve the users with educational, encyclopedic, teleshopping, banking, mail, medical and entertainment service.

Once the national Videotex service grows to profitable proportions, the decision as to whether to communicate with other international Videotex services, thereby, offering the subscribers communication with world sources of information should be considered.

4. Socioeconomic Implications

4.1 Technological and Economic Feasibility

The technologies involved in the establishment of national Videotex and Teletext services are now well known and understood. The main problem faced by a national administration in the process of evaluating alternative approaches is related to the existing infrastructure of telecommunications services, their capacity, geographical distribution, and quality. These factors have a strong impact on the decision-making process and add up to considerations directly related to the maintenance of an operational, interactive information retrieval system. An operational Videotex or Teletext system requires the continuous updating of the data base, the provision of information in content and form satisfying to the user, a possibly short response time and an acceptable quality and reliability. And, of course, the service must have a sound economic justification from the point of view of the administration, the information providers, the managing organization and the subscribers.

The experience gained in Europe shows that predictions as to the technical and commercial viability of Videotex and Teletext services can be generated with confidence, but only if based on data collected by monitoring the performance of an operational system in a realistic setting. This suggests that pilot projects are significant indicators of future system acceptance.

4.2 Analysis of Existing Networks and Alternatives

Thus, broadcasting, due to its one-way character, can be used for the provision of Teletext services only. Two implementation alternatives are feasible and should be investigated:

a) Assignment on an available (unoccupied) TV channel for Teletext transmission.
b) Adoptions of the vertical blanking interval (VBI) technology on an existing TV channel.

Option (a) has distinct advantages in terms of service quality which can be offered to the subscriber - a larger data base with shorter access time.
Option (b) is easier and less expensive to implement.

Broad-band cable networks (if bidirectional) have all the characteristics required to carry both Teletext and Videotex services. As a matter of fact, a broad-band switched cable network offers the most effective way for provision of high quality telematic services. Unfortunately, the initial investment in creation of a cable infrastructure with wide geographical coverage may be prohibitive.

Public switched telephone networks (PSTN) and packet switched data networks (PSDN) bear the characteristics required to carry Videotex services. In the process of evaluation of these technologies, one should remember that Videotex services constitute a heavy load on the telephone traffic. This is due to the fact that an average Videotex session is five times longer than a telephone conversation and results in correspondingly longer capture time for the lines and trunks of the PSTN. The average amount of data exchanged during a Videotex session is rather low and data are transmitted in bursts. These characteristics indicate that in certain situations PSDN should be preferred over PSTN as a possible Videotex carrier. Thus, countries without PSDN should carefully calculate the effect on network efficiency of multiplying the length of conversation.

Additional factors to be considered in network analysis are bit rates and bit error rates, delay times and network response times and of course the availability of either PSTN or PSDN services.

4.3 Economic Feasibility of Teletext

Two types of Teletext exist - broadcast Teletext and full-channel Teletext. The former refers to use of the vertical blanking interval to broadcast over either air waves or cable and is thus usually limited to about 160 pages (utilizing 4 vertical interval lines). The latter is assumed to apply to cable television whereby a channel is completely dedicated to Teletext and refers to approximately 15000 carouselling frames. This section mainly discusses the costs and benefits involved in setting up and using broadcast Teletext systems. Full channel Teletext is not discussed in detail in this report.

4.3.1 Costs

The speed and cost in establishing broadcast Teletext systems are incomparable to that of Videotex. It is estimated that the equipment to prepare and broadcast Teletext in the vertical blanking interval costs $80,000. If one assumed five people working at a rate of $30,000 a year, an additional cost of $150,000 accrues to the project. Assuming additional miscellaneous costs approximately $250,000 is the cost of the first year's operation less $80,000 for additional years.

Similarly, the cost to the user is much less than that of Videotex. Thirty percent of all new color television sets in Israel, for example, are already equipped with the Teletext adapter. The Teletext decoder itself costs approximately $125. Televisions without the built-in adaptor require an additional external adaptor at a cost of approximately $100. Estimates are that Teletext terminal costs will drop to $50 within this decade. The fact that more or less of an international Teletext standard exists will help lower the prices by increasing the unit quantity which an be produced.

4.3.2 Revenues

There are no direct revenues associated with broadcast Teletext. If Teletext frames are used for advertising, advertisers can be expected to pay a fee for such use to the broadcasting authority.

Teletext terminals with full channel Teletext at airports, shopping centres, etc. are sources of revenue. Rates for use vary. For example, the US Insource system in Dallas had, in 1984, terminals in shopping centres which could be accessed free by all users. The system was full channel having 17,000 frames to be accessed. However, both the shopping centre and the advertisers paid fees (for the latter, $35 a week).

4.3.3 Benefits

Teletext is a means of communicating bulletins, schedules, announcements, advertising, etc. It has limited educational possibilities, and is extremely useful for providing the deaf with captions. Its major advantage over Videotex is that it is cheap to install and operate at the system end. It also reaches a mass audience being cheap to install at the user end as well as having no cost per use. Furthermore, multinational systems can be set up where satellites (such as ARABSAT) are used to reach an entire region. However, broadcast Teletext is limited in scope realistically to 100 pages. The 15000 page system greatly extends the usefulness to the user but requires a major investment in the cable infrastructure. In a country like Belgium where 60% of the homes are already cabled, full channel Teletext offers a very serious economic alternative to Videotex.

4.4 Economic Feasibility of Videotex

This section analyzes the costs, revenues and benefits related to the establishment of a national public Videotex system. No attempt is made to analyze the market potential or structure of private Videotex systems. Several configurations of public Videotex systems exist throughout the world and two are shown below as Figures 4-1 and 4-2. For the sake of simplicity and also because of the plethora of analyses in existence, Prestel is used as the model for detailed analysis. Where the cost to use or other factors regarding private Videotex systems are relevant, they are referred to also.

Figure 4-1

Prestel

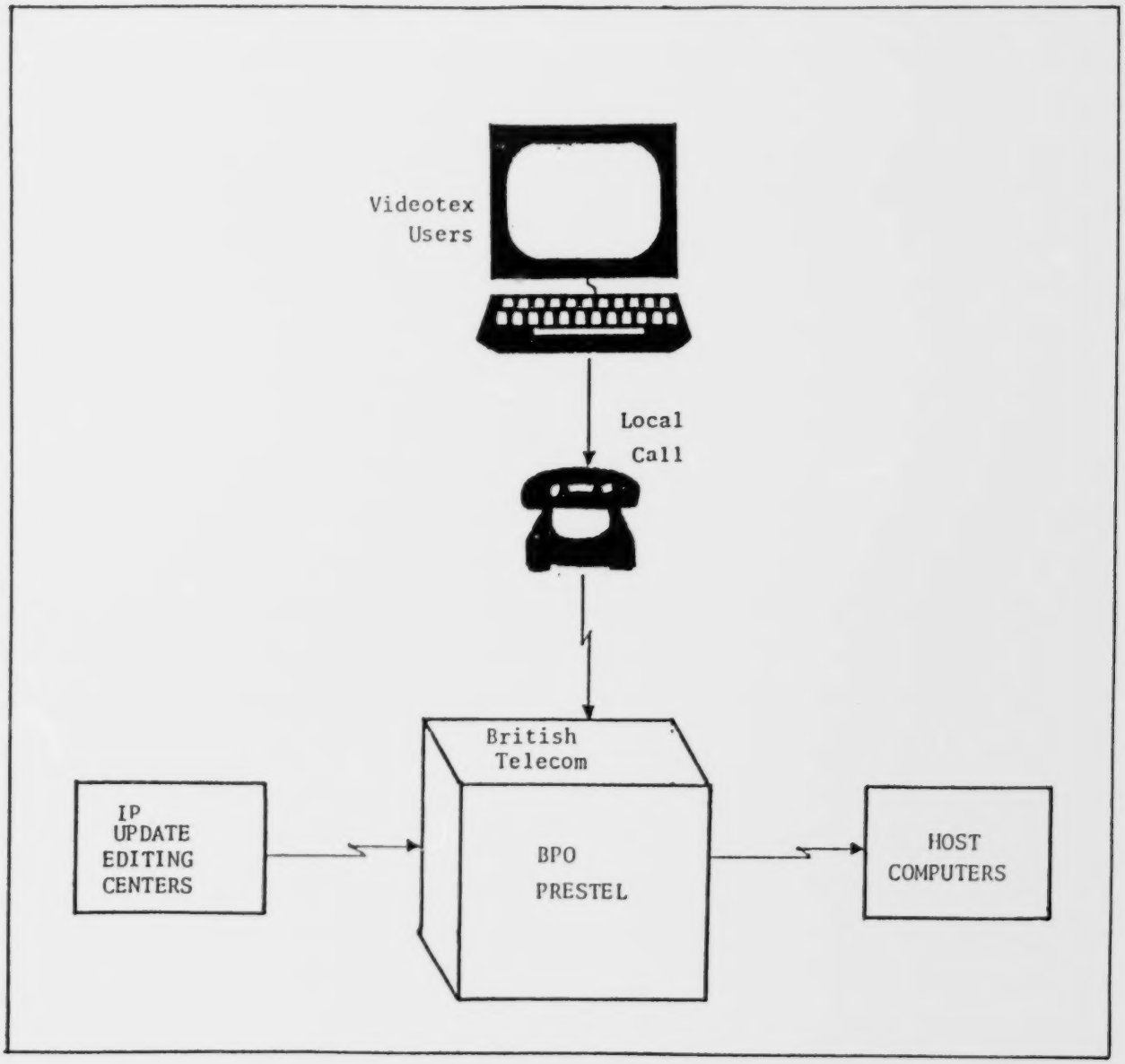
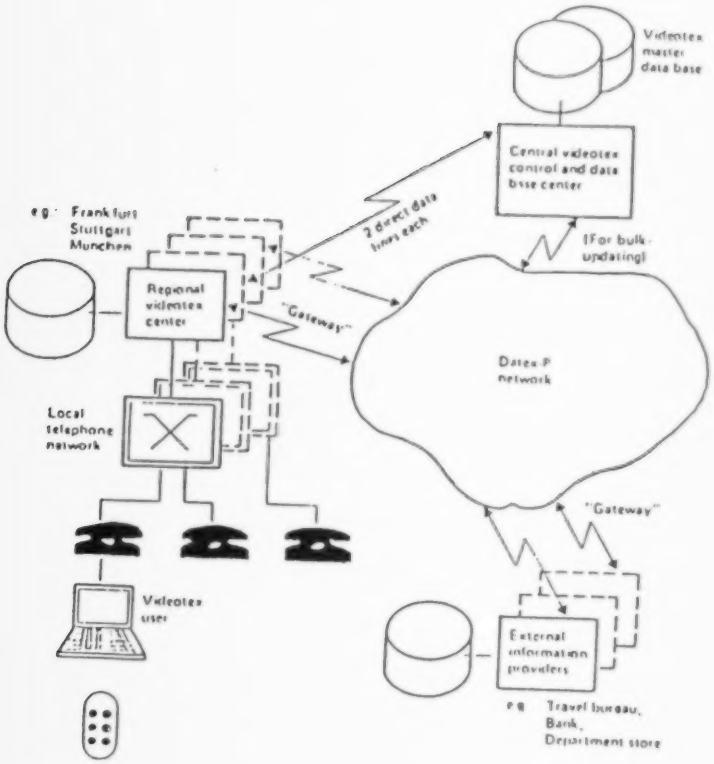


Figure 4-2

Bildschirmtex



Videotex in general is not so much an advance in technology as it is an advance in the standardization of the provision of information services. It is an umbrella of technical standards under which information can be provided directly to the end user (residential or commercial) in one consistent format (according to the selected Videotex protocol). The aim of the public Videotex system is to bring this service to all users at a reasonable cost (whether profit should be a consideration is discussed at a later point). The cost, however, only becomes reasonable when economies of scale are possible. Until then, either the costs are unreasonable or the service is unprofitable.

4.4.1 System Operator

The life blood of any national Videotex service is its ability to generate revenue which will not only cover its expenses, but also cover network expansion, research and development, and improved service costs.

4.4.1.1 Costs

The expenses of any Videotex service operator are similar to that of any large computer service bureau. Since the size of the organization grows as the demand for more subscribers and services increase, it is very difficult, in this guide, to predict a universal cost which applies to all service operators.

As a guide, a list of ingredients required will be presented. The value of each item can determined by each country:

A. Manpower:
- Director(s)
- Branch Managers
- Marketing Staff
- Sales Staff
- Computer Analysts/Programmers
- Computer Technicians/Operators
- Data Base Engineers
- Page Creators (Editors)
- Administration
- Secretarial Staff
- Communication Specialists

B. Computer Facilities:
- Two or more Mainframe Computers
- Disk Drives
- Modems
- Software
- Air Conditioners

C. Network:
- Telephone (PSTN) numbers
- Packet switched node (PSDN)

Other miscellaneous expenses to be taken into consideration depend upon the benefits awarded the personnel. These are country dependent as is the ability to hire qualified staff which fit these descriptions.

4.4.1.2 Revenue

The purpose of this section is to present the various sources of income to a public Videotex service operator and to examine the possible consequences of each billing policy. Pricing structures adopted by several countries were presented in Table 4-1.

A - Telephone Call Charges:

Increased revenue will be generated from the residential community during the off-peak hours. If the origin of call is not at local rate, then some arrangement must be found to absorb these costs by the operator. Telephone rates to the computer centre should not be a factor in whether to use the service or not. If business use is already high, then usage will increase. Precautions should be taken to ensure resource availability during peak hours. This may require the installation of telephone exchanges to handle the added load. If users find they consistently meet with a busy signal, they will quickly refrain from trying.

B - Subscription Charges:

Users may be required to pay either one time or yearly subscription fees. This will entitle them to a user identification number, a users guide, and Videotex service directories when they are available. The main purpose of this charge is to cover expenses of handling and of documentantion. Little if any profit should be generated otherwise the entry fee may be prohibitively high.

C - Time-Based Charges:

Most Videotex operators charge their subscribers for the time they utilize a port on the computer. Two tariffs are maintained; one for peak-usage usually from 8:00 am to 5:00 pm. This is usually a factor higher than off peak hours since it is assumed that the major proportion of usage during this time will come from the business community. The second tariff is for non-peak hours for residential use. Again this rate must be low enough not to be prohibitive. Finally, should system resources be used to capacity, the system may limit the usage by any user to a specified duration.

D - Closed User Groups:

Charges may be levied for maintaining private data bases available only to members of a closed user group. The administration required to handle the subscription and billing of members of the CUG and CUG privileges should be determined and priced.

E - Information Provider Charges:

Major revenue recognized from IPs is generated from framestorage. This should be done with volume discounts; IPs storing thousands of pages should pay less per page than IPs storing 10 to 100 pages. Again, one must determine what the IP feels is reasonable as opposed to service provider maintenance costs. Most IPs are charged a yearly standing charge. Small IPs will have little or no initiative to participate if this price is too high.

Editting requires a great amount of time both if pages are prepared off-line or online. If the communication time charge is high when editting, the IP may be discouraged from updating his data base at the frequency he desires.

F - Response Frame Charges:

Since response frames require the user to fill in the specific fields and then is stored, two types of charging exists:

1. The owner of the frames is charged page charges plus additional charges due to the exceptionality of this page.
2. Upon completing the frame it is then stored for the owner to review. Charges may be accrued for the number of days the frame is stored.

G - Bulk Update:

Those information providers who maintain their data bases offline may update their Videotex data base quickly without using the standard editting facilities. Using a high speed port, all the pages to be updated are transmitted one after the other to the Videotex computer without human intervention. This facility, although it saves time, requires costly computer resources. These resources must be calculated and appropriate values assigned.

H - Gateway/External Computer:

To connect an external computer to any Videotex computer, the necessary equipment is a point-to-point dedicated communications line connecting the two computers, 2 high-speed modems, and a dedicated port on the Videotex computer or communications network. The information provider is required to cover these expenses. Furthermore should any computer applications be necessary to support the external computer, the IP must completely cover these costs.

Table 4-1

Videotex Service Charges by Country
(Local Currency)

	AUSTRALIA	BRAZIL	DENMARK	FRANCE	ITALY	JAPAN	NETHERLANDS	SWEDEN	UNITED KINGDOM	WEST GERMANY
	A $	(CROZ)	DKR	FFR	LIT	YEN	FLORINS	SwKr	P.STRL	DM
Annual Charge										
Information Provider	2,700	6,400	4,000		2,120,000	800	10,000	40,000	6,500	600
Business User	150	175	600		120,000	ONE TIME	120	60	72	96
Residential User	30	27.4			20,000	800	120		26	96
Phone Call Charge										
Peak/Min - I.P.:										
Business	15/CALL	62/240SEC	5	.77/45SEC	150/CALL		15			
Residential				.77/2MIN		304/3MIN	15	.23		.27/8MIN
Off-Peak/Min - I.P:										.27/8MIN
Business	15/CALL	62/CALL								.27/12MIN
Residential										.27/12MIN
Connect Time										
Peak/min - I.P:	.12	FREE								
Business	.08	23			50		10	.30	.06	NONE
Residential	.08	36			50		10	.30	.06	
Off Peak/Min - I.P:	.07	FREE								
Business	.05	14			17				FREE	NONE
Residential	.05	36			17					
Frame Rental/Year	2.40-4.80	276 PER 50 ADDIT--IONAL			10,000	3200/10 FRAMES	10	2000/ 100 PAGES	5	28
CUG/Year	300	FREE	2,000		1,000,000	3600/100 USERS	2,000	NONE	320	600
Gateway	3,600	26,400	4,000		15,000,000		5,000	50,000		3,000
Terminal Rental/Month				85						
Editing Peak/Min									8P	
Off Peak/Min									8P/4min	

4.4.2 Information Providers (IPS)

In order for Videotex to succeed, information must be available which is cost-beneficial for the user to access. In order for information providers to provide information to videotex systems, they too must see it as cost/beneficial to them. Thus, the IP's revenues or benefits (or combination thereof) must outweigh the costs of involvement in the system.

4.4.2.1 Costs

As is shown in Figure 4-3, the Prestel IP pays telephone charges to Telecom, as well as storage costs, editing and other overhead costs for an estimated (1980) cost of $40 per frame per annum. Sub-IP's are information providers using the services of a larger IP for editing, maintenance, etc. of the frames. They have additional costs not shown here and of course the IPs therefore have additional unshown revenues .

IPs also have the option of residing on their own or another host computer and using the gateway to provide Videotex users with information. The economics of this choice are discussed in the Revenues Section below.

Although data on the actual costs (i.e. not estimated costs) to the Prestel IP was not researched in depth for this report, these figures seem entirely too low. It is quite possible that the real cost to Prestel was underestimated and that therefore the charges are set too low. And/or it is possible that the real cost to the IP is grossly underestimated. The estimates suggested by IBM for the Bildschirmtext seem more realistic. They estimate that a regional IP with 50 frames would pay about $70 a month for all transactions (e.g. access, storage, editing) - a cost of $16.80 per frame per annum. A national IP with 100 frames would pay about $320 a month or $76.80 per frame per annum.*

It is obvious that higher IP costs must mean higher costs to the user or higher expected return on investment to the IP. However, it also allows the Videotex system to be run on a profitable (or at least break-even basis). Furthermore, if the information services provided are of value to the user will use them more frequently thereby lowering the per unit cost.

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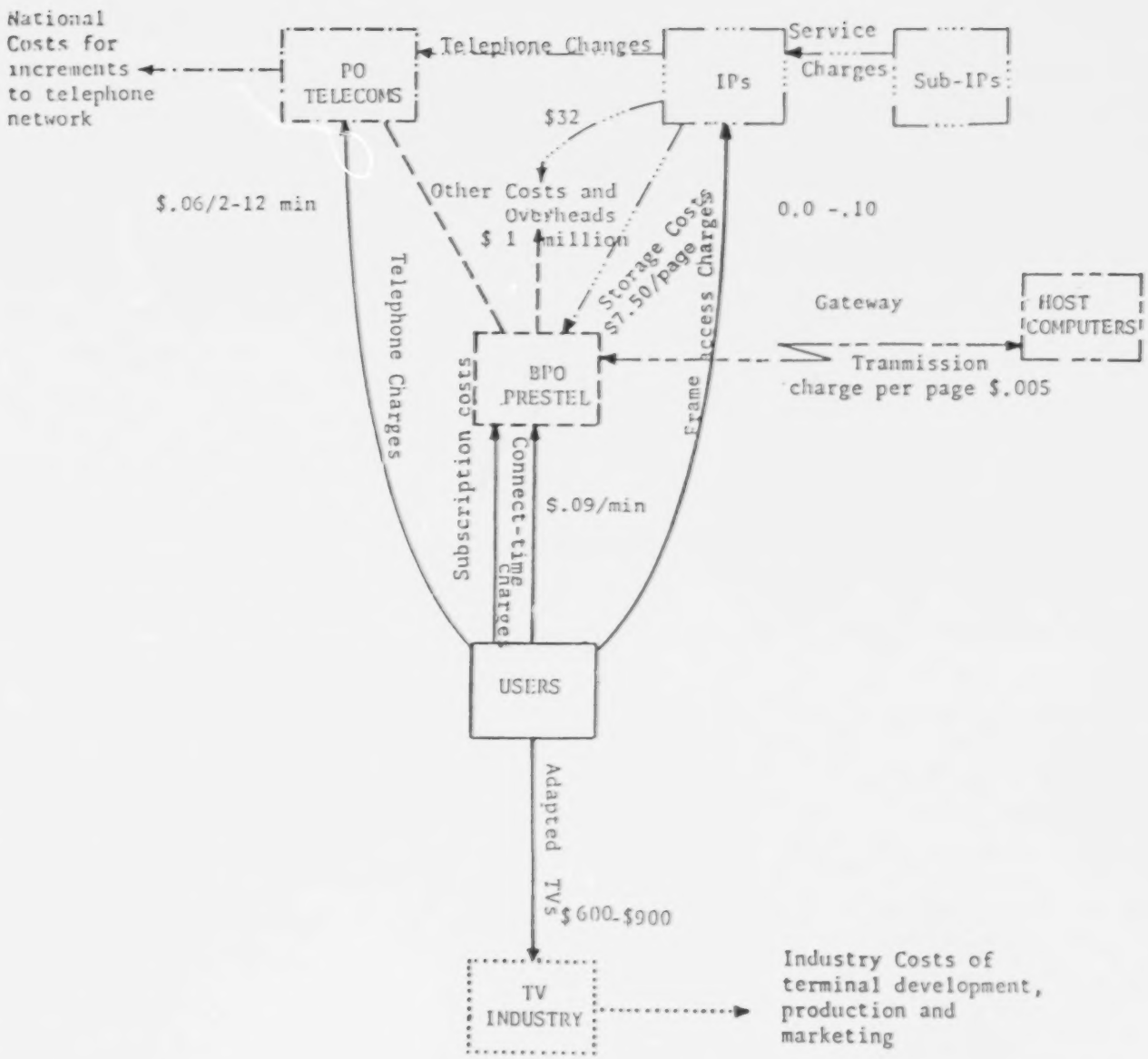
* Personal communication - IBM, Israel. Assumes $1 = 2.8 DM.

Figure 4-3

Cash Flow Related to Prestel (Assuming Peak Connect Time)



Adapted from: Woolf, Roger, Videotex, Heyden Press, 1980.

4.4.2.2 Revenues

Individual pages may be assigned a value such that when users view this page, the cost is added to their bill. This is one way in which information providers may realize revenue from their participation in the Videotex service. Psychologically, the price has it effect on the subscriber. Should the cost be too high, few users may access it. Regardless of the price, however low, some subscribers may not access these pages if they must budget their use. However, should the information be timely and of value to the viewers, and, should it be costly to produce and maintain then those viewers who benefit will pay in spite of the cost.

For systems with user frame charges the procedure for estimating costs per frame to the user (i.e. revenue to the IP) must be based upon:

1. Number of local centres (assuming the same data base in each centre).
2. Volatility of the data base (assumes here weekly updates).
3. Size of data base - in frames.
4. Average frequency of access to each frame of the data base.
5. Cost of accessing a frame through the gateway to a host computer
6. Cost of supplying access to a page through either the Videotex system or the gateway.

Thus, Prestel assumptions for page charges follow the scenario shown in Table 4-2 below. IP costs are assumed to be $48 per frame per annum. If each frame cost $48 and an estimated 4800 accesses are assumed, a page charge of $.01 will allow the IP to break even. This of course assumes equal value. IPs may vary page charges to reflect real access conditions. If more data bases are put on the Videotex system the likelihood of an IP's page being accessed decreases unless there exists a simultaneous increase in the number of ports and subscribers. The use of the gateway to host computers partially alleviates this problem. The host computer no longer need pay storage costs but must now pay transmission costs ($.005 per frame) from the user network access point to the host computer. One can evaluate the relative value of maintaining a frame on a host vs. public Videotex computer by comparing storage, maintenance and editing costs on the public system to the storage, maintenance, and editing cost on the host plus the transmission cost. (This is not a trivial cost since a non-Videotex computer utilizes an entirely different concept for retrieving data. While a single disk access is assumed in a Videotex system, multiple disk accesses and reformatting of data to Videotex protocol may be necessary for the host computer system).

As stated above, the gateway only partially alleviates the problem. The user's port is still being tied up for the time he accesses the host through the gateway. Thus, the pages on the system itself which can be viewed by the user are also decreased.

TABLE 4-2

AVERAGE YEARLY NUMBER OF ACCESSES PER FRAME

ONE PRESTEL SERVICE CENTRE GENERATES 30 MILLION PORT MINUTES PER ANNUM:

300 PORTS USED 300 DAYS FOR 5.5 HOURS ON AVERAGE

= APPROX. 30 MILLION PORT MINUTES PER ANNUM.

AT 4 FRAMES PER MINUTE (ONE EVERY 15 SECONDS) THE NUMBER OF FRAME ACCESSES AT 10 SERVICE CENTRES IS:

30 MILLION x 10 x 4 = 1200 MILLION PER ANNUM.

WITH 250,000 DIFFERENT FRAMES, THE AVERAGE NUMBER OF ACCESSES PER FRAME IS:

$$\frac{1200 \text{ MILLION}}{250{,}000.} = 4800 \text{ PER ANNUM}$$

4.4.2.3. Benefits

The benefit to the IP resides in either increased profit directly or indirectly related to the use of the Videotex system or in increased service to the public, or specific clientele. The former is self-evident. Examples of the latter are the library which can now reach a wider audience or the bank which has a more satisfied clientele.

4.4.3 Users

4.4.3.1 Costs

The users of Videotex systems ultimately bear the following costs (some may be borne by the information provider, or the system in the short term):

A. Videotex Terminals (TV + Terminal + Modem).
B. Frame access charges.
C. Subscription charges.
D. System connect time charges.
E. User telecommunications charges.

A - Adapted Television:

The adapted television set is composed of the television set, Videotex terminal and modem as interface with the telephone line. (In some countries the modem must be acquired separately from the PTT. Rent charges vary from $3 to $15 per month. TV Sets are acquired (bought or rented, according to country) from the TV industry which usually does its own development production and marketing. France is an exception to this rule. Prices of these adapted sets vary from $600 - $1250 (when not subsidized) and will not drop drastically until volumes of subscribers increase by an order of magnitude. Microcompumter owners can use their computers as Videotex terminals, with appropriate software - costing about $85 to $100, for example. The NAPLPS decoder produced in volume of 5000 units sells for $1250, in volume of 5000-10,000 units for $800, and in 10,000-100,000 units for $550. Thus, the standardization albeit voluntary of terminal specifications within a country benefits the user in increasing the number of units to be manufactured and lowering the cost to the consumer.

B - Frame Access Charges:

Figure 4-3 diagrams the specific cash flow related to the Prestel system. Not all Videotex systems have frame access charges. For example Bildschirmtext has none, nor are all frames on Prestel charge frames. In the section, concerning the IP, the setting of frame access charges was discussed. In general, if the user does not pay this charge, it is built into higher priced connect time or subscription fees.

C - Subscription Charges:

Many of the public Videotex operators charge subscription fees of from $12-$50 a month and/or startup fees ranging from $25-$100. Some public Videotex systems such as Prestel charge only businesses with subscription charges. Bildschirmtext, on the other hand, charges about 8DM to everyone.

D - System Connect-Time Charges:

Connect-time charges are the charges for the time the user is tying up the port regardless of the number of frame accesses made during that time period. With a limited number of ports, both amount of time on the line and amount of accesses are important. Prestel, for example, charges $0.09 for 1 minute of connect-time depending upon the period of use (i.e. standard US peak). The Austrian Videotex system charges a connect-time charges of $1.80, but there are no page or telecommunications or subscription charges.

E - User Telecommunications Charges:

The user currently communicates with the public Videotex system over regular telephone lines. With Prestel, charges for the use of these lines are paid at the normal rate. Thus, in the UK, the rate in 1980 was $0.06 for either 2,3, or 12 minutes depending on period of use. In FRG, the rate was approximately $0.64 for 8 or 12 minutes for regional calls (1983). In some cases, the IP or external host may be picking up the user s telecommunication charges. In the UK, the system is designed to have identical data bases at each of the regional centres. In the FRG, the regional centres have local data bases as well as global (national) data bases. Additional access charges of $0.06 a frame access are charged for use of data in another regions' system. In Austria, the system is currently set up to charge only at local rates even if long distance calls are made. This was instituted as a temporary measure until all regional centres are established.

4.4.3.2 Benefits

The user's willingness to use the system and his willingness to pay for the use are directly related to his perceived need for the system and its perceived value for him as well as his ability to pay. Perceived value can accrue in one of four ways:

A. The system adds value to currently existing services.
B. The system provides a new service of value to him and not previously supplied elsewhere.
C. The system provides convenience of value to him.
D. The system provides actual cost-savings in the conduct of his business, personal or otherwise.

In countries like the UK a fraction of the expected market has so far responded to these services. For example, as recently as 1980, Prestel analysts were saying that a minimum of a 200,000 subscriber base was needed to break even. In 1985, there were still only 62,000 subscribers. Although the users made longer calls than predicted, they actually accessed less frames.

4.5 The Public Videotex System

Previous figures and discussion have outlined what is meant by the public Videotex system. This section and the subsequent one are rather brief due to a lack of reliable data. A great deal of the literature deals with user/IP costs and little with system costs. Occasional references exist in the literature and further research is being done in this area:

A - In brief, it is reported that in 1982 the Netherlands set aside $56 million dollars to develop their Videotex system over a 5 year period.

B - The Prestel budget in 1978 alone was $23 million.

C - Operating one Prestel service center costs under $1 million per annum including capital and running costs, overhead and a proportion of corporate headquarters costs.

D - Elnet, An Israeli telecommunications firm, estimated the cost of $2 million for establishing one node (service centre) of a Videotex system irrespective of costs to the Ministry of Communication, while approximately $1 million was spent by an Israeli bank to establish a Videotex system usable by the public for banking only.

E - It was reported in 1983 that GEC was awarded $7 million to build the public Videotex system for Austria.

The difficulty in analyzing these data lies in determining what cost factors are included in the figures. One factor does emerge as central and that is that the telephone company must be willing to suffer years of losses to get things going. Prestel in 1983 was estimated as having spent several times more than it was receiving in revenues .

4.6 Analysis of National Videotex Demand

Estimating potential demand is always a precarious task in risk of gross misestimates directly affecting estimates of system costs, usage and prices. One therefore, attempts to be as accurate as possible while recognizing the probability of error. With Videotex in particular the task is made difficult by the plethora of experience by different countries with different systems or methods of introduction and the dearth of discrete data relating to costs, usage and prices. In an analysis done for the Israeli Ministry of Telecommunications, Prestel was chosen as a model for estimating demand, mainly because of the data provided by the network. Table 4-5 below is an example of such data although another model could be used if data were readily available.

Using the Prestel data and those prices shown previously in Figure 4-3 one can estimate the potential use and cost of use of Videotex. However, first, one must estimate the total number of likely subscribers disaggregated into home and business use. This total can be estimated based on national statistics and/or by detailed survey.

Table 4-5

October 1985 Prestel Data

Terminals Attached to Prestel	62,000
Proportion in Business	55%
Proportion in Homes	45%
Information Sources	1,000
Frames Available for Access	312,000
Monthly Frame Access (in millions)	7.1
Monthly Messages Sent	115,000
Gateway in Operation	74
UK Telephone Users with Local Call Rate, Prestel Access	98%

The goal of the analysis is to estimate future demand realistic to the country's socioeconomic conditions. Use of GNP or GNP per capita as comparative measures do not accurately reflect the cultural or economic acceptance of information technologies. National statistics such as use of computers, number of households with televisions and telephones can be used as a rough order measure of potential subscribers, e.g. 1/10th of all households with televisions by year and/or 1/2 of all businesses with microcomputers by year. It is highly recommended that several scenarios be built to reflect possible usage and that each be compared to comparative system costs in order to determine breakeven points.

Surveys are particularly useful in determining potential marketable content of Videotex . In countries with high inflation, use of Videotex for electronic funds transfer is more likely .- the client must constantly be aware of his economic status and to act on it. These countries would be expected to show a higher money transfer rate than others. Likewise, countries with a very high cost of and difficulty in buying up-to-date reference materials might be more likely to appreciate, for example, an online encyclopedia.

From experience gained in the industrial countries providing Videotex services, the residential market has been much slower to benefit from Videotex's advantages than the business community. In developing countries, the potential use in business depends very much on the application, availability of technology, the telecommunication infrastructure, cost of equipment and services, and competing services.

Using the estimates of potential subscribers and the previously mentioned Prestel (or other country model), one can build a simulation which might look as follows:

1. Millions of Minutes of Use by Users.
   Data needed: For each year of analysis, number of subscribers by home and business and number of minutes average use in each category.

2. User Fees to be Collected for Videotex Use.
   Data Needed: For each year of analysis and each category of use, prices charged per minute perhaps for a fraction of the time (e.g. in off-peak hours) and quarterly or monthly fees (if any).

3. User Fees Collected for Local or Long Distance Calls.
   Data Needed: For each year of analysis, each category of use and each type of call (i.e. local versus long distance , prime versus off-peak), prices charged per minute or per call or both.

4. Potential Information Provider Pages to be Stored.
   Data Needed: For each year of analysis , potential number of pages stored or transmitted and prices charged to information providers or gateways .

5. Information Provider Fees Collected for Local or Long Distance Calls
   Data Needed: For each year of analysis , each category of use and each type of call (i.e. local versus long distance , prime versus off-peak), prices charged per minute or per call or both.

6. Investment in Hardware by Users.
   Data Needed: For each year of analysis and each category of user (including information providers) amount of hardware software needed for those with previous other hardware (e.g. microcomputers) or those with none.

Using these tables one can estimate for each year the total expected revenues to the system as well as the outlays of both the IP and the user. One can then compare these data to expected system costs to determine the potential breakeven point looking at either a purely system view or looking at a more national view and including the user and IP outlays as well.

4.7 National Videotex and Teletext Policy Options and Considerations

The issues concerning the decision to provide public Videotex and Teletext services are not wholly economic. There are also social, legal and political considerations of particular concern at the national level. For example, a government might decide to invest in public Videotex not for the profitably (or potential profitably) but rather for one or all of the following reasons:

- Provide support to an indigenous information technology industry thereby encouraging technological development and in the long term improving exports.
- Improve the telecommunications infrastructure and/or make greater use of the existing network.
- Set standards which commercial enterprises could adhere to thereby introducing economies of scale and easing the system learning burden placed on the consumer.

A government might also decide to enter or not enter into public Videotex/Teletext for political reasons. The country's neighbors might be draining away either hard currency (in the case of Videotex) or viewers (in the case of Teletext). Thus, a decision might be made to become an international competitor or national substitute. A negative decision might be made based upon the weighing of the political cost in entering into an operation assumed to be unprofitable for the first several years.

Some of the major issues surrounding the Videotex/Teletext debate are as follows:

- Should there be public Videotex and Teletext systems?
- Who should be the operating authority?
- What will happen to the existing industry structure?
- Who will control editorial content?
- How can information privacy and data security be maintained?
- How can intellectual property be protected?
- What should be the rules for advertising?

Each of these points is briefly discussed below.

4.7.1 Public Videotex and Teletext Systems

Table 4-6 shows the various types of Videotex and Teletext systems along with their relative potential volume of use. Broadcast Teletext is a cheap quick means of providing a limited amount of information to a large audience. Public Videotex systems provide a large number of pages in high volume to a large number of users at a medium to high price. Why then should Videotex be a public service rather than a private service? In Europe, the public system is the rule, while in the United States it is the private bureau (after deregulation AT&T is within this designation). Even where public systems exist, private systems may often operate as long as they meet the technical requirements of the networks.

TABLE 4-6

CATEGORIZATION OF TYPES OF VIDEOTEX AND TELETEXT BY POTENTIAL USE

SYSTEM TYPE	VOLUME OF RETRIEVAL	VOLUME OF USERS	NUMBER OF PAGES ACCESSED	COST TO ACCESS
BROADCAST TELETEXT	HIGH	HIGH	LOW	LOW
PUBLIC VIDEOTEX	HIGH	HIGH	HIGH	MEDIUM/HIGH
PUBLIC VIDEOTEX GATEWAY	MEDIUM/LOW	MEDIUM/LOW	HIGH	MEDIUM/LOW
PRIVATE INHOUSE VIDEOTEX	HIGH	LOW	MEDIUM/HIGH	HIGH
PRIVATE VIDEOTEX BUREAU	MEDIUM/HIGH	MEDIUM/HIGH	HIGH	HIGH

Public Videotex systems have the following advantages:

A- They set a standard which although it may be voluntary is nevertheless generally accepted by the national community.

B- They provide mass-oriented services at a reasonable cost and which are in principle available to anyone.

C- They maximize use of existing telecommunication facilities.

D- They encourage technological innovation on a national level.

Private systems on the other hand are designed wholly to make a profit and therefore address only that audience which is profitable. Nevertheless, in many countries the private sector questions the advisability of public authorities entering into what they consider to be basically a profit-making information service. They object to the use of public funds to create projects in competition with the private sector.

4.7.2 Operating Authority

National telecommunications authorities have two possible courses of action. They can retreat to the safest part of their regulated monopoly, to the supply of a network and the provision of voice channel services, and watch the major part of the telecommunications pass to other organizations. Or, they can attempt to compete with those encroaching upon their traditional business.

In some countries, it is not a question as to whether or not Videotex and Teletext will proceed. The question is more at what level of government support, intervention or competition. The National Telecommunications Authority and the Postal Authority are generally regulated monopolies acting as common carriers of information within a country. They supposedly avoid duplication of facilities, pass on economies of scale, are regulated in the public interest and use the price of some services to subsidize others.

There exist several problems related to Videotex and these authorities. First, Prestel found that they needed to become a "Modified Common Carrier" in order to effectively reach the marketplace. That is, they needed to become involved in the production of information they carried. Second, there exists a vast established network of older technologies not necessarily compatible with the new systems. (Here, developing countries have the advantage of being able to establish modern systems without ripping out older ones). Third, there exists a great deal of pressure from those who wish to supply new equipment and from those who wish to use it.

With regard to Teletext, the difficulties arise in determining under whose operating authority Teletext rightfully belongs and under what legal authority it operates. Is it radio/television broadcasting? Is it the same as a newspaper? Does the Communications Authority need to license it?

In the Netherlands, for example, the public authorities have a strong central role. There are six ideologically different broadcast organizations with one neutral coordinating body and little commercial influence. The Central broadcasting coordinator (NOS) manages the Teletext operation (Teletext) and is an information provider to the Videotex system (Viditel).

The question is also raised as to how to develop the system. In the UK, Prestel was developed inhouse. In FR Germany, IBM developed Bildschirmtext under contract, and in Austria, no development was done but an existing system was purchased. The latter appears to be the solution for a country wishing to establish a system in 1986 and beyond.

4.7.3 Industry Structure

There are many special interest groups concerned with Videotex and Teletext. They include but are not limited to:

- Post Office/Communications Authority.
- Broadcast Authority.
- Newspapers.
- Publishers.
- Banks.
- Computer industry.
- Information providers.
- Equipment manufacturers.
- Film industry.
- Journalists.
- Trade unions.
- General public.

Each group has their own particular concerns. Each is worried about how they can fit in, how their current market will potentially be displaced. In FR Germany, for example, there has been disagreement between the broadcasters who wish to create and disseminate information and the newspapers who would like the broadcasters to only disseminate information which the newspapers have gathered. The New York Times attempted for many years to be a distributor of information through the New York Times Information Bank. Not long ago they discontinued this and decided that they would leave dissemination to others.

There is a very thin line today between telecommunications, data processing, broadcasting and publishing. Once, one could simply define these industries as follows:

Telecommunications: responsible for telephone and telegraph.
Data processing: responsible for computers and computer services.
Broadcasting: responsible for radio and television.
Publishing : responsible for books, journals, newspapers and other printed material.

Today, these industries are in the process of evolution. The resulting hybrids use data processing for storage, retrieval and manipulation of information, common carriers and/or broadcasting media to transmit information and what is more the content of the information being carried could rightfully be called either publishing, banking, merchandising or education. Videotex and Teletext while having a impact on all sectors also have a role for all sectors.

4.7.4 Editorial Content

Legal complications abound in determining who rightfully should/can control the content of the information carried on Videotex/Teletext. The issues involve censorship, freedom to use the service, liability for information contained therein and journalistic privilege (e.g. right not to divulge sources).

Teletext can not be operated by just anyone. It requires broadcasting and therefore is restricted by the same conditions as television, radio or other broadcasting in a country. Content, however, of Teletext is still an issue. In UK, for example, television companies use their editorial staff to gather and edit information while in France it is done by Le Bourse and the Meteorological Office and not by broadcasters.

There can be freedom to establish a Videotex system as long as it meets technical requirements of the network. The censorship/ liability/privileges issues remain a problem. In Sweden, for example, the Freedom of Expression Act relating to newspapers was applied to Videotex. In the UK the information providers have voluntarily established a working code of ethics.

It is necessary to thoroughly study a country's laws regarding these issues before a statement can be made. It is impossible to anticipate every problem which will arise. No one, for example, expected the strong negative reaction from the public to the listing on Prestel by a porno-store of pornographic books.

4.7.5 Information Privacy/Data Security

The issues of information privacy and data security are not unique to Videotex (Teletext is not relevant here) but rather apply to all information processing. Information privacy refers to the right of the individual to give or refuse permission for others to use/see information about him, his family, transactions, etc. Data security refers to the process by which the data handlers prevent unauthorized access to data files.

There is rightfully concern as to the ease of access to Videotex systems. Sophisticated users should demand contracts with Videotex systems (public or private) which limit the use of gathered personal information. However, the buyer must be aware that to date no clear legal position exists as to the legality of Videotex contracts. In general, data privacy legislation is assumed to apply. Liability laws should be strong enough to ensure that the systems provide all possible levels of data security.

4.7.6 Intellectual Property

The issue of abuse of intellectual property (copyright) is seen as one of degree and not as something entirely new. There is a great deal of debate in the general area of databases and directories as to the legal rights of the user once he has paid to see a particular item online or receive it in print form. Database producers of both online bibliographic systems and Videotex systems recognize the ease with which a client can download a screen image for post-processing on his home microcomputer (software and additional hardware together cost under $300). Generally, there has been concern and legal action only against abusers who attempt to profitably use the information gathered.

4.7.7 Rules for Advertising

There is a fuzzy line distinguishing dissemination of information and advertising. Is the bus company listing a timetable advertising? and what of the bookstore listing books sold there? The British IPs Trade Association, for example, lists 46 acts relating to what can be deemed advertising. In Sweden, all advertising is governed under a single market practices act. Whether and how a country chooses to control advertising is very much related to their current practices.

5. Videotex Activities by Country

5.1 Europe

5.1.1 United Kingdom

A British research engineer, Sam Fedida, is generally recognized as the inventor of Videotex, or Viewdata, as it was then known. With other members of his team at the Post Office Research Centre, Fedida developed this concept during the mid-1970s to the point of a practical working system, based on the idea that an untrained user, using a TV set could be linked through the telephone network to computerized stores of information. In 1974 a working model of Viewdata was demonstrated and in 1976 a public pilot trial started, with a few information providers and a few dozen Viewdata sets on their premises and those of the British Post Office (now British Telecommunications). A full commercial service, known as Prestel began in 1979.

During the same period, engineers at the British Broadcasting Corporation and the Independent Broadcasting Authority were developing broadcast teletext services (named respectively Ceefax and Oracle) and in 1976, both the BBC and the IBA received full government support to begin nationwide public Teletext services.

At the end of 1982, Prestel had about 15,000 users (more than 90% of whom were business firms) and were gaining about 400 new users a month. Nearly 500,000 British homes were receiving broadcast Teletext on one or more of the three British networks and the number of TV sets bought or leased in Britian that are equipped with the special decoder for receiving Teletext signals has been growing at a rate of 30,000 to 40,000 per month (Edwards, 1982).

In fall 1985 Prestel had approximately 60,000 subscribers - 45% private and 55% business. There were 400 operational private systems and 70 gateways. The Prestel data base had 337,000 frames.

Prestel offers a wide range of topics from antiques to washing machines, and from book reviews to job vacancies. Actually, much of the information on the system is business-oriented (since most users are businesses), including international commodity prices (updated every five minutes) and various financial data bases. These compete quite effectively with traditional online search services by providing lower prices and easier to search systems. Flight schedules for 57 airlines are published on Prestel and ten of these provide direct booking on the system (a form of transactional Videotex service). TWA'a flight schedule, which is distributed at no charge (except in connect fees), provides information on stand-by availability for departing flights.

"Micronet 800" Prestel's telesoftware service has proven to be the major catalyst for successfully penetrating the residential market due to the large population of personal computers in the UK. More and more owners are joining Prestel in order to enjoy the rich and diversified library of free and low cost computer programmes.

The technical configuration of Prestel service centres is based upon GEC 4000 series computers, with four 70-megabyte disks on one of the external multiplexor channels, and a total of 208 lines (expected to increase to a maximum of 384 later) on the other four multiplexors (the sixth channel is used for local peripherals). Four megabyte disks can hold 250,000 frames at 1 kilobyte per frame. Higher capacity 270-megabyte disks are available for the GEC 4000 series computers, giving a four-disk system. Additional disks can be added as increased capacity is required.

Prestel service centres are distributed across Britain within local call telephone reach of almost 97% of the population.

The total "information costs" for using Prestel 10 minutes per day (as of September 1980) were 2.73 British pounds per week for call rates, computer access and information provider frame charges. Adding in the increase in TV rental charges, this would sum up to about 285 pounds per year (+VAT).

The three British TV networks (BBC-1, BBC-2, and ITV) offer some approximately 100-page magazines that are frequently updated and changed during the day.

The services offered on Ceefax include news, food-guide, news flashes, finance, an entertainment guide, an alarm clock, sports, weather and travel, and some subtitling on BBC-1. BBC-2 provides news background, fun and games, TV and radio programs, a finance spectrum, sport features, consumer reviews advertisers, also offers regional Teletext services from two to four, reducing the total time to transmit a 100-page m[illegible]ine to 15 seconds. A recent development in Ceefax technology en[illegible]s the transmission of pictures of photographic qualit[illegible] well as the transmission of "telesoftware".

5.1.2 France

Teletext and Videotex also emerged in France during the 1970s. In the early 1970s, the French Centre for the Study of Telecommunications and Television (CCETT) was established in Rennes as a joint research centre to develop new technologies for the French PTT and the French broadcasting authority, TDF.
The outcome of this work was Antiope, a system incorporating both broadcast Teletext services and interactive Videotex services. In 1978, France adopted a national plan based on the recommendations of Simon Nora and Alain Minc (1980) to develop an integrated information services network using the Antiope system.

The first major implementation was the French PTT's Teletel Videotex service, which began in 1981 as a home-based trial in Velizy, a suburb of Paris. In this trial, 2,200 households were equipped with Antiope-adapted colour television sets connected to the telephone lines via a modem. A computer centre run by the Ministry of Telecommunications was put at their disposal for the duration of the trial and some companies or organizations offered services, including: the state railway's seat-reservation system, checking from the home, a message switching service, mail-ordering, etc. In addition, 1,000 of the 3,000 sets used in the trial allowed access to the Antiope services offered by the TV networks, and distributed by TDF.

By fall 1985 there were 1,200,000 Teletel terminals installed in France - 60% general public; 40% business. The computer network permits 16,000 accesses simultaneously. The number of installed terminals is expected to grow to 3 million by the end of 1986.

According to a report (International Videotex Teletext News, September 1982), during the first year of the trial, each of the 2,200 homes participating in the test averaged two calls per week, with typical access times of 13 to 15 minutes per contact. During each session, users looked at three or four different IPs' pages. The most frequently accessed services were news and press information, specific reference data (e.g., train schedules) and teleshopping. For the test, customers had free use of terminals and no-charge access to databases, but paid for telephone connect time.

French PTT is renting Minitel terminals to users of its Teletel service. The black-and-white stand-alone terminal will be rented for 85 Francs (10 US$) per month. Nearly 1,400 services are available via Teletel, including an electronic publishing network, home banking, electronic shopping and travel information. Also, services for specialized user groups (construction, banking, finance, shipping) are offered.

In 1982, a start was made to equip all 250,000 telephone subscribers in the Ille et Vilaine region of France with a black-and-white special Videotex terminal, to be used as an "electronic directory". Using it, they would be able to look up the names of all other telephone subscribers, at first in Ille et Vilaine, and later in the whole of France. Equally, they would be able to consult the "professional list" (equivalent to the Yellow Pages), and have access to supplementary information of an advertising nature. Since the trial in Ille et Vilaine was a success, the service is being progressively extended to the rest of France and, by 1992, about 30 million electronic directories are expected to be in use, instead of the printed directory.

5.1.3 West Germany

The West German Bundespost announced in April 1977 its contract with the British Post Office for the supply of Prestel software and know-how and demonstrated its Bildschirmtext system that Autumn. Starting in 1978, a pilot trial of two years was set up to demonstrate the system.

In 1980 a public market trial began, involving about 3,000 participants. Two GEC 4082 computers were installed in Dusseldorf and a second dual GEC 4082 system was installed in Berlin, to support more market trial participants. At the end of 1979, 40,000 pages of information were entered and by February 1981, 80,000-90,000 pages were available in each centre (CSP, 1981).

In 1983 the West German Bundespost accepted the European CEPT Videotex standard and contracted IBM for further development of the system and network.

Gateways to France, UK., Switzerland, Austria and the Netherlands are planned.

5.1.4 Austria

Austria has been using a modified Prestel format with DRCS and alphageometrics. Plans, however,call for adopting the CEPT level-3 standard. The Austrian network, at present, operates a control centre in Vienna and their regional centres at Vienna, Salzbury and Klagenfurt. Plans call for regional contres in Graz and Innsbruk by early 1986, followed by Linz in 1988.

As of fall 1985, 3,650 subscribers and 28 gateways were connected. The accessible data base had approximately 70,000 frames. Objectives called for 6,000 subscribers by the end of 1985, 12,000 by the end of 1986 and 80,000 by the end of 1990 with the standard Videotex terminal is Mupid II developed by the Graz University. This device rents for Sch. 200/month with modem. Gateways to Germany and Switzerland are planned.

5.1.5 Belgium

Due to the national language requirements (French and Flemish) the Belgium PTT has adopted to provide both English Prestel and French Teletel services in order to satisfy the dual needs. The numbers of subscribers is expected to approach 10,000 by the end of 1986. At present, there is one public host computer, but, this is expected to be upgraded to 300 ports on 11 Videotex access points by 1986.

Due to the proximity with France as well as language, a gateway with France is being discussed.

5.1.6 Denmark

Teledata, the Danish Videotex service began as a trial in 1982, is based upon the Prestel technology. The consortium reponsible for the service is composed of the Danish PTT and three private telephone companies (Copenhagen, Jutland and Funen)

Two computer centres located at Copenhagen and Arhus supported, as of fall 1985, 1210 subscribers (92% business; 8% private), with 3 gateways, and 200 Videotex access points.

5.1.7 Italy

The Italian PTT has now completed its trial period and is going ahead with its plan to operate a nationwide Videotex service. The service making Videotex accessible via a local telephone call from anywhere in Italy, is to be completed within five years. During the trial period, the technology adopted by the Italians has been Prestel, but, for the nationwide public service both Prestel and CEPT will be offered. To date, Videotel, the Italian Videotex system serves 2,000 users from the regional centre in Milan. By the end of 1985 the CEPT computer centre in Rome is expected to be connected to the Prestel computer centre in Milan. Among applications offered will be online telephone directory.

5.1.8 Luxembourg

The Luxembourg PTT plans on launching its CEPT level-3 format Videotex service by mid-1986. Presentation will be in three languages; French, German and the Luxembourg dialect. Information retrieval will be keyword as well as menu driven.

5.1.9 The Netherlands

Holland had, by mid-1982, a Teletext service reaching 170,000 users and a Viditel Videotext service with 4,700 users (International Videotex Teletext news). The PTT in Holland has acknowledged that several Videotex networks can exist side by side, and therefore has issued specifications regarding the use of the public telephone network, enabling private network operators to offer their own Videotex services.

The Viditel Videotex system is based on Prestel technology and uses the same GEC 4082 computer as Prestel. The initial configuration had a page capacity of 140,000 pages, which could be expanded easily.

As of fall 1985 the status of the Viditel network was 18,500 subscribers (70% business, 30% private) with 10 external computers and 17 gateways.

Further plans call for the transition to CEPT level-3 display (but no specific date has been set), and the connection of the French Teletel service to Viditel. Major applications are electronic mail and the telephone directory.

5.1.10 Norway

The Norwegian PTT's Videotex service Teledata is still in the trial stage, but is expected to go commercial in 1986. During the trial, Prestel was chosen for the display format, but CEPT level-3 will be offered when the service goes public. During the trial period 350 users and 125 information providers were served by 256 Videotex access ports.

During 1986, gateway access to other countries as well as electronic telephone directory will be among the services offered. The user community is expected to grow to 22,500 by 1990.

5.1.11 Spain

The Spanish national telephone authority CTNE became involved with Videotex in 1978. Initially, it developed its own Videotex standard, not compatible with those of the rest of Europe. During this trial period, Ibertex, as it is called, supported a user community of 500 users with no external computers connected.

The Spanish authorities plan to adopt the CEPT level-3 format when Ibertex goes public in 1985.

5.1.12 Sweden

Sweden's national Videotex service, Datavision, has adopted the Prestel technology initially with plans to migrate to CEPT by 1987. Currently, computer centres in Stockholm and Gothenburg support 7,000 users with 15 external computers connected.

Datavision's objectives are to reach 20,000 users by 1986, and then 40,000 by 1987 when the CEPT technology will be supported. By 1990, 400,000 users are expected.

Data retrieval on the Swedish system is by keyword as well as menu driven. Electronic mail and Videotex phone directory are the major applications.

5.1.13 Switzerland

The Swiss standard is CEPT and the experimental network operation has 2,200 subscribers with two regional centres in Zurich and Berne, and 21 gateways. Some 70% of the subscribers are business and 30% private users. The Swiss PTT intends to commence its national public Videotex service by mid-1987.

5.2 North America

5.2.1 Canada

During the mid-1970s, the Department of Communications in Ottawa became interested in Teletext/Videotex developments. By the end of 1978 an integrated Teletext/Videotex system called Telidon evolved and later became the basis for the North American Presentation Level Protocol Syntax (NAPLPS).

From 1981 to the present, many trials were undertaken by different governmental bodies and private concerns. Project "IRA" of Manitoba included telemonitoring of household meters as part of its service. By mid-1982, more than 10 field trials were under way with an estimated 3,000 participants.

With the North American growing as slowly as it is, only two major commercial Videotex are still active and growing.

Grassroots Canada, an information service intended primarily for the agriculture trade is gaining in momentum in Alberta, Manitoba, Saskatchewan and Ontario. At a monthly cost of $15 (CND) this NAPLPS based system serves 2,300 users.

Teleguide, a tourist and entertainment service, based in Toronto, reaches all the major gathering spots in the city. Public access kiosks and terminals provide crowd-drawing information displayed in NAPLPS graphics. Private users can access the system from their terminal at a cost of $.05 per minute.

Canada stills plays a major role in NAPLPS-based system software, editting systems, decoder hardware and software development and manufacture.

5.2.2 The United States

The Videotex scene in the US is characterized by a proliferating number of trials and service plans. Some are aiming at the business maiketplace, others at the residential marketplace. Equipment, standards and information services are different and fluid. No clear pattern has yet emerged regarding the distribution of functions among the parties interested in providing Teletex/Videotex services. In some instances, a single organization plays all three roles of information provider, system operator and communications network provider. In other trials, different groups play each of these roles.

The American National Standards Institute (ANSI) adopted the NAPLPS standard and several networks based on this standard have been installed. The penetration of NAPLPS is limited due to the relatively high terminal costs. Table 5-1 lists US Videotex and related services and trials. Table 5-2 lists US Teletext trials and services. Among the most developed systems, The Source uses a display format of 80 columns and 24 rows, while Compuserve uses a 32 x 16 display. Clearly, there is little, if any, compatibility in the systems and trials proposed thusfar. The various Teletext and Videotex systems not only are incompatible with systems within their ovn generic class but also are incompatible from one class to another. Standards setting, whether by industry or government, has yet to penetrate many dimensions of this technology.

Table 5-1

Commercial Videotex Service
United States

SYSTEM NAME	SYSTEM OPERATOR/ PARENT COMPANY	PROTOCOL	AREA SERVED	CHARGES	USERS/ START DATE
CitiNet Boston	Applied Videotex Systems	ASCII	Boston	Free	10,000
Compuserve	H & R Block	ASCII	National	(N) $6.50HR (P) $12.50/HR	250,000
Covidea	AT & T Chemical Bank Time Inc., Bank of America	ASCII NAPLPS 	National		Nov/85 (41,000)
Delphi	General Videotex Co.	ASCII	National		10,000+
Dow Jones News/Retrieval	Dow Jones	ASCII ASCII	National National	(N) $.20/min (P) $.90/min	205,000
Gateway	Time Mirror Videotex Services	NAPLPS	Southern California	(N) $4.25/HR	Nov/85 (2,000)
Genie	General Electric Network for Information Exchange	ASCII	National	(N)$ 5.00/HR* (P)$35.00/HR* **+$10 for 2400 BAUD	Nov/85
Grassroots America	Videotex America	NAPLPS	National	$9.00/HR	400
Keyfax Interactive Information Service	Keycom	ASCII NAPLPS	Chicago	.06/min	32,000
Newsnet		ASCII	National	(N)$18/HR (P)$24/HR	8,000
The Source	Source Telecomputing Corp.	ASCII	National	(N) $7.75/HR (P)$20.75/HR	62,000
Trintex	CBS - IBM - SEARS	ASCII NAPLPS	National	- -	10/1987
Videolog	Videolog Communcations	ASCII NAPLPS	National	(N) $15/HR (P) $39/HR	1,000
Viewtron	Viewdata Corp. of America	NAPLPS	South Florida	$24.95/MO	3,000

Note: N = Non-peak Hours
P = Peak Hours Usage

Table 5-2

U.S. Teletext Trials and Services

SYSTEM NAME	SYSTEM OPERATOR/ PARENT COMPANY	PROTOCOL	AREA SERVED	USERS/ START DATE
Electra	WKRC - TV	Prestel	Cincinnati	200
Extra Vision	CBS	NABTS	National	500
Telecaption		Captioning	National	85,000
Teletext 5	KSL - TV		Salt Lake City	600
Agrisat	University of Wisconsin's Extension Service	Prestel	Wisconsin	N.A.

5.3 South America

5.3.1 Argentina

Radio Victoria S.A.I.C., the Argentina conglomerate, has adopted the NAPLPS system in its private system whereby product information and orders between drugstores and pharmaceutical suppliers are to be communicated.

The Buenos Aires-based service represents Argentina's first Videotex network and is targeted primarily to the business community. Travel, real estate, pharmaceuticals, financial services, building construction, and legal services are the targeted industries.

5.3.2 Brazil

Telesp - Telecomunicaqoes De Sao Paulo S/A - Brazil's National PTT has been undergoing a trial Videotex service based on the French Teletel technology since December 1982.

Commercial service began early in 1985 with over 200 user ports, but this will be increased to 432 ports.

Upon the commercial service launch, there were 1370 users and 82 information providers

5.3.3 Colombia

The French Foreign Office has donated Teletel Videotex systems to two educational centres in Bogota Colombia. University Unisur and Sena, an education centre will utilize the systems for TeleLearning.

5.3.4 Ecuador

First commercial Videotex service has been installed by Banco Popular. Based on Teletel software, the bank intends on offering such services as home banking, newspapers, travel agencies, airlines and department stores.

Computer centres in Quito, the capital city, and Guaya Quil, the major port city, will serve 200 users initially but, when fully implemented will serve 4,000.

5.4 Near East, Far East and Oceana

5.4.1 Australia

On Febuary 28, 1985, Telecom Australia Launched Viatel, its Prestel-based commercial Videotex service. As of fall 1985, Viatel had recorded 8,000 users, accessing information provided by 110 information providers. Via a multiplexor network, local access is available nationwide, to the computer centre in Melbourne. To date, 3 gateways are available. Major applications include telephone directory, electronic mail, health information services, using both keyword and menu driven. Telecom Australia anticipates user growth at 10,000 per year.

5.4.2 China

The Chinese PTT is in the process of implementing a Videotex system based upon the French technology. At present, both countries are in the process of developing a Chinese character set for Videotex terminals, and developing network specifications concerning access points, hosts, production system and terminal production.
Network specifications are to be completed by fall 1986, and the trial system will be launched in Beijing in mid-1987.

5.4.3 India

Doordarshan, India's national television authority has adopted Antiope, the French Teletext system, as its entry point into Videotex services. Initially news, weather, public transit data and other timely information will be broadcast in English from New Delhi. Plans, however, call for transmission of Teletext magazines in each of the country's 15 different languages, using Antiope's DRCS capability.
Initially, French firms are supplying both know-how and equipment. Eventually, India will manufacture its own Teletext decoders for distribution.

5.4.4 Japan

Commercial Videotex services exist since December 1984 with centres in Tokyo, Osaka, Yokohama, Kyoto and Kobe. The national Videotex standard is Captain previously successfully tested in trials conducted throughout the country. There are 2,700 subscribers so far with 15,000 expected in mid-1985 and 50,000 in 1987.

5.4.5 Malaysia

The system named "Telita" is managed by the Malaysian Telecom Department. During 1984, trials were conducted in the Kuala Lumpur area and commercial services are scheduled for 1985/6. The operational format is Prestel. There were 47 subscribers and 25 information providers in October 1984.

5.4.6 New Zealand

The New Zealand Post Office has been offering a limited Videotex service since the end of 1983. During this period, both Prestel and Teletel protocols were supported, although all commercial data bases were strictly Prestel based. Plans however call for support of NAPLPS by early 1986. No plans exist for adopting CEPT.

To date, 1000 terminals and 20 service providers have been active in the limited service, 6 of which have been conducting trial services. International telex and keyword search are amongst the services provided.

New Zealand is basing their Videotex traffic on their packet switching network. Fifty-seven Videotex access points (totalling 856 terminal access ports) are located in Auckland, Christchurch and Wellington.

5.4.7 Singapore

Teleview, Singapore Telecom's National Videotex service, is Prestel based, and the world's first hybrid system.

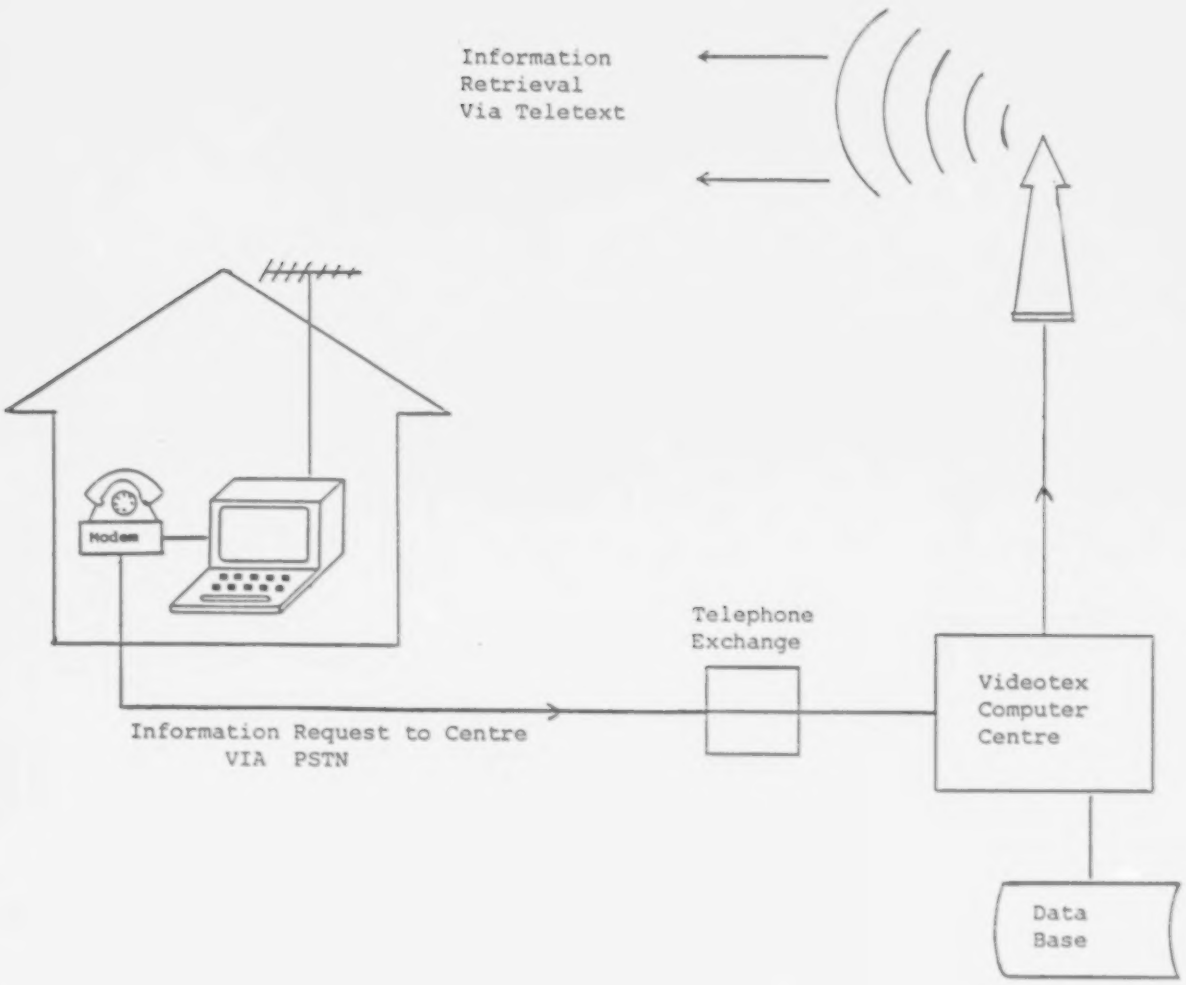
Combining both Videotex and Teletext technologies, users, via the telephone network will request information from the three host computers. The response signals will be fed to the user terminals through broadcast television.
Due to the high speed return channel, photo Videotex can be transmitted. See Fig. 5-1.

Where TV signals are not available, standard two-way Videotex will be implemented. Teleview is planning to launch its commercial service in March 1987 to more than 1000 customers. This number is expected to reach 1 million by 1990.

Major applications will be telephone directory, electronic messaging, telex and photo Videotex.

Fig. 5-1

Singapore Hybrid Videotex Service



Appendix A

Videotex and Teletext Services

A.1 Business Community Applications

The variety of business-corporate applications that can be implemented on videotex are listed below:*

1. Directory of Videotex Services: A menu of all the different services you have on your Videotex system.

2. Lobby Directory: Name, location, telephone number, and mail stop of everyone who works in a particular building. Can also include maps and floor plans.

3. Personnel Policy Manual: Policy manuals that are frequently updated, widely distributed, and infrequently used are ideal Videotex applications.

4. Organization Charts: Since organization charts are hierarchical, they lend themselves to Videotex.

5. Sales Literature Index and Order Form: A complete listing of all current sales literature organized by product, product line, application, market, etc., together with an order form. Salespeople simply indicate the material needed and fill in a simple form on the screen with delivery information.

6. Training Courses: Self-paced courses - "How to Use Videotex" "How to Use the Internal Telephone System" etc. - can be presented on Videotex. One advantage of Videotex is that the course material is always available for reference.

7. Account Profiles: Key personnel, purchase history, credit information, general background, and other material needed by sales and marketing can be accessed through Videotex.

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* The list of applications has been copied with permission from DEC's-Digital Equipment Corporation publication "A Guide to Corporate Videotex".

8. Product Specifications: Product bulletins and specification sheets are either out-of-date, out-of-stock, or out-of-print when they are needed most. Videotex lets you publish product information electronically so that it is always up-to-date, always accessible. And it is a simple matter to print out the screens you need so they can be included in customer presentations and proposals.

9. Vendor Agreements: Purchasing agents will find that Videotex is an ideal medium for accessing vendor profiles and agreements.

10. Job Postings: By putting job postings on Videotex, they are readily available to anyone having access to a computer terminal. This eliminates the need and expense of posting openings on bulletin boards throughout the organization. New openings can be listed immediately and, as jobs are filled, "postings" can be taken down.
11. Distribution of Standard Reports: In most organizations, any number of standard reports are published on a regular schedule and widely distributed. These can be put on Videotex. Access can be controlled by terminal and password.

12. Interplant Transportation Schedule: Shuttle bus and van schedules. Interplant mail and package delivery schedules.

13. Competitive Marketing Data: Price and performance analysis, feature and benefit comparisons, and other competitive information can be put onto Videotex so that it can be accessed by salespeople in any field office.

14. Real Estate Listings: Many organizations maintain listings of real estate in their area to help employees who are transferred. With Videotex these listings can be organized by community, by price, house type, etc.
15. Newsletters: Videotex is electronic publishing. Many of the newsletters your organization publishes could be put onto Videotex, saving printing and distribution costs.

16. Bulletin Boards: Departmental, organizational, project, personnel, and employee activity bulletin boards all can be put onto Videotex. It is even possible to set up standard forms that employees can fill out to place "classified" ads.

17. Offices by Region or State: In large organizations someone is always looking for mailing address of the San Francisco office, the telephone number of the San Diego office, or the name of someone in the Sacramento office. With Videotex this information is instantly available. You don't have to search the office for a directory that was probably out-of-date by the time it was distributed.

18. User Manuals and Instructions: The copier doesn't work, you're having a problem with the telephone; user manuals and instructions together with "key operator" telephone numbers and names can be put onto Videotex.

19. Parts Lists: Videotex provides a medium for distributing up-to-date component and parts lists. Optional high-resolution graphics provide the opportunity to use exploded-view and schematic drawings.

20. Price Lists: Prices change frequently. With Videotex, any Videotex, any sales-person can access an up-to-the-minute prices list.

21. Budgets and Financial Reports: Quarterly financial reports, budgets, and other financial planning documents can be put onto Videotex. Duplication, distribution, and mailing costs are eliminated, and security is actually improved because confidential material is not left on desks.

22. Sales Report: Videotex can provide access to current and past sales reports by region, product, or customer.

23. Directories: Telephone, personnel, office, product, and departmental directories can be maintained on a Videotex system. Additions, deletions, and changes can be made quickly and easily.

24. Trade Show Demonstrations: A single-user, stand-alone Videotex system will not only be a "draw" in your booth but it also enables prospects to find out what they want to know about your equipment without having to pick their way through pages of specifications in a catalog or wait for a salesperson.

25. Registration Systems: Interactive Videotex can be used to record registrations at sales meetings, trade shows, and other events. It can also serve as a bulletin board for last-minute notices to attendees.

26. California Menus: Daily and weekly menus. In large organizations where many employees have to go from one floor or even one building to the next to get to the cafeteria, posting menus is a real service.

27. Organizational Calendars: Meeting and trade show calendars, promotional calendars, production and developmental schedules can all be kept on Videotex.

28. Point-of-Sale Displays: Videotex sells. It can accurately answer customer questions. It can show the features and benefits of a product. But more importantly, it can involve the customer. Many shoppers might hesitate to talk to a salesperson but welcome the opportunity to find out more about your product by using a Videotex terminal.

29. Office Supply Catalog/Ordering System: With Videotex you can create your own office supply catalog. Orders can be entered directly into the system.

30. Educational Course Catalog: Employee, managerial, sales training, secretarial skills, and enrichment courses offered by your organization can be listed on Videotex. The system can also handle registration.

31. Benefit Program Information: Pension, profit-sharing, life insurance, vacation, stock purchase and other employee benefit plans can all be detailed with Videotex. Although this does not eliminate the legal requirement to publish benefit information, it will eliminate a lot of telephone calls to your benefit program administrator. This is particularly true for organizations that offer different health insurance options. Videotex makes it easier for an employee to compare a health maintenance organization and a conventional insurance plan.

32. PR and Advertising Fact Sheets: Financial, employee population, product, and sales facts and figures. Approved "boilerplate" copy. Feature and benefit list. Trademark lists. Editorial guidelines. Product positioning statements.

33. News Digest: In most organizations the grapevine is the fastest means of communication. A Videotex news digest provides a means of distributing information throughout the organization quickly and inexpensively. News bulletins can be highlighted on the directory menu so anyone logging on to the system knows there is something of interest.

34. Signature Authorizations and Approval Lists: Who has to sign for what? What are the dollar limits?

35. Promotional Calendars: What advertisements are running where this month, next month? What trade shows are scheduled?

36. Hotel Accommodations: List of recommended hotels by city with rates and a reservation request form.

37. External Educational Programs: List of Colleges, programs, and courses of interest to employees.

38. Vacation Schedules: Who is going to be out when? Who is covering for whom?

39. Home Phone Number Directory.

40. Emergency Telephone Directory: Doctor, ambulance, security, fire, police, and maintenance numbers.

41. Internal Classified Telephone Directory: Who do you call for building maintenance? For security? For information about a particular product? Who is in charge of a particular department?

42. Zip Code Directory: Zip codes of all regional offices, distributors centers, etc.

43. Airline Schedule: Schedule of most frequently used flights by destination.

44. Classified Bulletin Board: Cars for sale, housed for rent, etc. Videotex organizes board information so it is easy for employees to find what they are looking for. Providing a "Bulletin Board" is an effective way of getting more people in your organization comfortable with computers.

45. Package Delivery/Messenger Service: Schedule, telephone numbers, shipping instructions, rates and other information.

46. Project Management Status Reports: When status reports are on Videotex they are always available and current.

47. Reference Tables: Metric conversion, mileage, postage, and other reference tables can be put onto Videotex so they are available to any one in the organization.

48. Directory of Computer Programs and Resources: Is anyone in the organization running a program for finite element analysis? What will the program do? What kind of computer is it running on? Who can tell me more about this application? Having a directory of computer resources organized by application and department can improve computer utilization.

49. Database Directory: Directory and description of databases available within the organization.

50. Who-Knows-What Resource Directory: Who in your organization speaks Spanish? Who is a notary public? Who is active in community affairs? Who serves on a particular professional committee?

51. Distribution Lists: Directors, officers, department heads, supervisors, project team and other internal distribution lists.

52. Dictionaries: Definitions of words, terms and acronyms unique to your business.

53. Reference Library Card File: A Videotex card catalog of all material available in your corporate reference library.

54. Directory of Retail Sales Outlets: Who carries your product in Atlanta? How much do they sell? Who is the key contact?

55. Internal Distribution List Management: Add or remove names. Change mail stops, etc. Transaction processing.

56. Trade Show Registration and Literature Distribution: A standalone Videotex system can simplify customer registration and help you learn more about the people who visit your booth. Because of the novelty of Videotex, they'll answer more questions than they would if you asked them to fill out a paper form.

57. Competitive Analysis: Videotex provides an ideal way of making analysis of competitive equipment available to the field.

58. Policy and Procedure Manuals: Any manual that has to be isssued or updated on a regular basis is a candidate for Videotex.

59. Engineering Standards: Videotex electronic publishing assures that your engineering staff is working with the current standard. The problem of "updating" standards is greatly simplified.

60. Product Directory.

61. Industry Statistics.

62. Personnel Questionnaires.

63. Market Research Data.

64. Magazine Subscription Lists.

65. Reading/Reference Lists: What information is available about a particular subject? Up-to-date reading/reference lists can help professionals stay current.

66. Public Database Directory: Information on the various "public" databases that may be accessed through your corporate Videotex system.

67. Membership Lists.

68. Directory of Consultants: Who do you have on retainer? What are their specialties? What do they know about your markets, products, or industry?

69. Document Distribution: Standard distribution and routing lists. Internal mailing lists.

70. None-English-Speaking Audiences: Any application can be made available in a number of different languages. For example, you might want to make Personnel Policies and Procedures available in Spanish or French.

71. Catalogs.

72. Travel Services: Mileage between plants, rental car agreements, hotels that offer discounts, passport and visa information.

73. Corporate Objectives and Policies.

74. Customer Visit Planning: Information needed when customers are planning to visit one of your facilities, including hotel information and rates, information on restaurants, directions and mileage from airport to plant, etc.

75. Directory of Translators: Who in your organization can speak or translate written French, German, Italian, etc.? Having a Directory of Translators can be invaluable when you're dealing with overseas customers.

76. Professional Directories: Who belongs to which professional organization? Professional membership lists can be used by personnel and public relations. They are also something that members of professional organizations will be interested in accessing.

77. Instructions for Handling Hazardous Materials: When you have a video terminal on the loading dock, receivers can immediately access instructions for handling and storing hazardous materials.

78. Banking-Opening New Accounts: Videotex is an effective sales tool. With a Videotex system on their desks, platform officers have an "interactive flip chart" that can help them sell bank services.

79. Banking-Directory of Services: A stand-alone Videotex lobby display is an effective way for a bank to present current interest rates and its full range of services to the public.

80. Parts/Service Departments: Videotex can not only provide parts lists and prices but it can also show "exploded" views of different components to help customers and part department personnel identify different items.

81. Factory Data Acquisition: Videotex can provide shop specs and serve as a "travel card" in job shops. Operations can be checked-off on the Videotex screen when they are completed. Additional information - the number of parts machined, the number of rejects, machine time, etc. - can be entered into the system.

82. Employee Activities: Videotex can carry information about trips, vacations, bowling leagues, and other employee activities.

83. Announcement Calendars.

84. Expense Reporting.

85. Open Houses: People who attend open houses want to know more about your business. Videotex can provide the information they are looking for. You can even include information tailored to special interest groups.

86. Disclaimers, Legal Boilerplate: Standard copy that has to be used in sales literature, contracts, and poposals.

87. Annual and Quarterly Financial Reports.

88. Reference Accounts: A list of reference accounts, organized by product, industry, or market is an invaluable sales tool.

89. Discount/Sales Tax Tables.

90. Amortization Tables.

91. Directory of Employee Assistance Programs.

92. List of Approved Vendors.

93. Forms Catalog and Library: There are any number of different forms used in your organization. Many are used infrequently. These forms can be put onto Videotex so that they are instantly available to anyone who needs them. Hard copies can be printed as required.

94. Weather Reports: In many businesses, such as retailing, weather directly affects sales. Videotex can provide up-to-the-minute weather information on a market-by-market basis. Weather reports are also important to the business traveler.

95. Plant Security: Videotex can provide building plans showing locations of emergency exits and alarm systems. These systems can be integrated with Videotex so that "problems" can be visually pin-pointed on the plan.

96. Trade Press Digest: What is the trade press saying about your company, your industry, and your competitors? A trade press digest can keep everyone abreast of industry news.

97. Employee Relocation Information: Information about relocation allowances and policies.

98. Cost/Profit Centre Directory.

99. Employee Purchase Plans: Many companies have employee purchase plans with special price lists, catalogs, order forms, etc. All this material can be put onto Videotex.

100. Branch Office Directories: Name, job title, telephone, etc. of local branch personnel.

101. Directory of Information Providers: Who is responsible for maintaining which Videotex applications? A directory of application providers tells who to call when you have a question about a particular application.

A.2 Residential Community Applications

Electronic Publishing

1. Electronic newspapers: Text from local and national newspapers and wire services. (Resident or gateway).

2. Specialized information: High-cost newsletters and articles from professional journals, magazines, proceedings, and periodicals. Ability to retrieve information on a selective basis. (Resident or gateway)

3. Electronic encyclopedia: Online reference service with frequent updating. Presented and maintained by the publisher. (Gateway).

4. Library catalogue: List of all library material, with the capability of reserving items. (Gateway).

Community Services

5. Community bulletin board: List of all local events. Accessible by subject type, place and date. (Resident)

6. Transit/travel information: Bus, train, subway and airline route and schedules. Intercity connections can be included. (Resident and gateway).

7. Emergency services: Accident, road conditions, pollution, weather reports, police, fire, hospital, ambulance, and drug store telephone number and locations and hours of service. (Resident).

8. Housing availability: Multiple listing service. House, apartment, condominium sales and rental, hotel and motel room availability. (Resident and gateway).

9. Comparison shopping: Information on current prices for particular products - where they are least and most expensive. (Resident).

10. Foreign language: Translations of community announcements and other information. (Resident).

11. Electronic directories: Telephone directories and "Yellow Pages", listing of stores, buildings, organizations, hours of service available by category and location. (Gateway).

Note: Resident - Implies that the data base may reside on the Videotex service computer

Gateway - Implies that the data base resides on the information providers computer due to size of the data base and complexity of search method.

Education

12. Course listings: Extension courses, night school, classes, private school offerings available by subject, location, fee, etc. (Resident).

13. Computer-assisted instruction/computer-managed instruction: Course material programmed to move with individual's speed and capability. (Resident and gateway).

14. Interactive "Correspondence" courses: For students who are unable to attend school on a regular daily basis. (Gateway).

15. Supplemental material for Educational TV programs: Practice lessons accompanying educational broadcast programmes, such as "Sesame Street". (Resident or gateway).

16. Do-it-yourself training: Step-by-step training in home and auto repair, gardening, cooking, etc. (Resident).

17. Literacy: Basic language and mathematical skills. (Resident or gateway).

18. Retraining: Online tutorial programs to train and monitor. (Resident or gateway).

Health

19. Home medicine: Systems with details on diagnosis, treatment, drugs, health risks, costs, etc. (Resident).

20. First aid: What to do in case of ..... telephone numbers to call, list of first aid courses, where and when, etc. (Resident).

Entertainment

21. Electronic music store: Access to large libraries of recorded music listed by song, singer, category, album name, etc. (Resident or gateway).

22. Schedules: Television, radio, cinema, theatre schedules. (Resident or gateway).

Advertising

23. Electronic Yellow Pages: Directory-type information on products and services updated regularly, accessed by category. In enhanced version could be combined with order-taking capability. (Gateway).

24. Supplement to television advertising: National advertisements with local dealers and price information. More detailed description of product. Could have order taking capability. (Resident).

25. Classified advertising: Similar to newspaper classified advertising but with more indexing, retrieval, and order taking capabilities. (Resident or gateway).

26. Display advertising: Show weekly specials and product information. (Resident).

Transactions

27. Electronic check book: Purchases made over the Videotex system. The purchase amount is automatically deducted from the user's checking account. (Gateway).

28. Electronic fund transfer: Videotex users have access to their bank accounts via their home terminal. They have the ability to manipulate their accounts and make transactions. (Gateway).

29. Electronic credit card: User enters his account number into the Videotex response frames for purchases and bill paying. (Gateway).

30. Electronic catalogue: Online access to catalogues with order taking capability. (Resident or gateway).

31. Lottery/gambling: Receive information and risk information for legal gambling and lotteries. Ability to participate in the lottery or gambling via response frames. (Resident).

32. Entertainment: Electronic box-office services, Leisure time planning, vacation options. Could include revues, ratings and guidebook information. (Resident).

Messaging

33. Electronic mail: Point-to-point messages for personal or business correspondence. (Resident).

34. Videotexgram: Efficient method of sending same message to distribution lists. (Resident).

35. Conferencing: Shared textual space by conference participants. (Resident).

36. Referenda: Citizen input to government officials on controversial issues. (Resident).

37. Consumer action: Complaints and reactions to products or services are channeled through consumer ombudsman service with feedback to participants. (Resident).

38. Market research: Use and comments about new product is tracked through online polling of consumers. (Resident).

Computing

39. Telesoftware: Video games, business applications, educational courses, etc. Provide additional computing power to home micro-computers. (Resident).

40. Personal information storage: Private electronic files for home-related information. (Resident).

41. Financial management: Personal finance management. (Resident or gateway).

42. Telework: Text editing, file maintenance, data entry and analysis. (Resident or gateway).

43. Extensions of corporate management systems: Available to workers at home and at other convenient locations (i.e. motel rooms). (Resident or gateway).

Telemonitoring

44. Home security: Remote sensors. Emergency fire, police notification. (Gateway).

45. Health and safety monitoring: Assist in at-home care (i.e. ECG, blood pressure, etc.). (Gateway).

46. Energy: Control and regulation of household energy use. Gas, electrical, water meter reading.

Appendix B

Videotex Standards

B.1 The Status of Standardization

Videotex and Teletext services can be structured into seven Layers according to the Open System Interconnections (OSI) architecture defined in the following documents by ISO and CCITT:
- ISO-DIS 7498 Open System Interconnection Basic Reference Manual.
- ISO/TC97/SC16 Draft Reference Model for Open System Interconnections.

A system which obeys applicable OSI standards in its communications with other systems is termed an open system.

The seven Layers of the Model are Listed below:

a) The Physical Layer provides mechanical, electrical, functional and procedural characteristics essential for data bit transmission between the communicating parties.
The relevant existing standard protocols for the Physical Layer are defined in the CCITT Recommendations V.22, V.23, V.24, V.25, V.28, in ISO2110; in EIA RS-232-C; in DIN 66020 and DIN 66021.

b) The Data Link Layer provides functional and procedural means to establish, maintain and release data-link connections. This Layer handles the problem of error detection and correction in the physical Layer. The relevant standard protocols are:
1) The CEPT Recommendation T/CD6-1.
2) The Functional Specification for Bildcshirmtext Terminals FTZ 157 D2E. Deutsche Bundespost.
3) Prestel Terminal Specification. Prestel Headquarters. London.
4) The HDLC High Level Data Link Control protocol of IBM.

c) The Network Layer handles the problem of data routing between various nodes of the network. This Layer provides functional and procedural means for data transportation in a way independent of routing and switching considerations. The most popular protocol handling these problems is defined by the CCITT Recommendation X.25.

d) The Transport Layer provides transparent transfer of data between session entities. The transport layer is an end-to-end Layer; a process on the source-end system converses with a peer process on a destination-end system.
At present, approved national or international standards do not exist for the transport Layer. Some of the draft documents considered are Listed below.
1) ISO DP 8073 - "Information Processing - Open Systems Interconnection - Transport Protocol Specification" Draft Proposal, June 1982.
2) ECMA Standard 72. Transport Protocols.
3) CCITT Rec X.75 Provisional - Terminal and Transit Control Procedures and Data Transfer Systems on International Circuits Between Packet Switched Data Networks.
4) CCITT Rec. X.214 and X.224 under study.

e) The Session Layer synchronizes the dialog and manages the data exchange between the communicating parties. Approved session Layer standards do not exist.
Proposals currently in process of evaluation include:
1) ECMA - Standard 75 session Protocol Feb. 1982.
2) CCITT Recommendation X.215 and X.225 under study.

f) The Presentation Layer is responsible for displaying the information to the communicating entities in a way that preserves the meaning while resolving syntax differences. The services provided by the Presentation Layer consist of data entry management, information control, display and exchange in a structured form.
The Presentation Layer protocols for Videotex and Teletext services are defined in detail by international and national standards Listed below:

1) CCITT Recommendation F.300 Videotex Service.
2) CCITT Recommendation S.100 Videotex Terminals International Information Exchange for Interactive Videotex.
3) CEPT Recommendation T/CD 6-1 European Interactive Videotex Service, Display Aspects and Transmission Code.
4) ANSI .3110 - 1983. Videotex Teletext Presentation Level Protocol Syntax, North American. (NAPLPS)
5) T500 - 1983 Canadian Standards Association Same as 4 above.
6) FTZ 157 D2E Deutsche Bundespost West German PTT) Functional Specification for Bildschirmtext Terminals.
7) CAPTAIN by Ministry of Post and Telecommunications (MPT) and Nippon Telegraph and Telephone (NTT), Japan.
8) Prestel Terminal Specification, Prestel Headquarters, London.

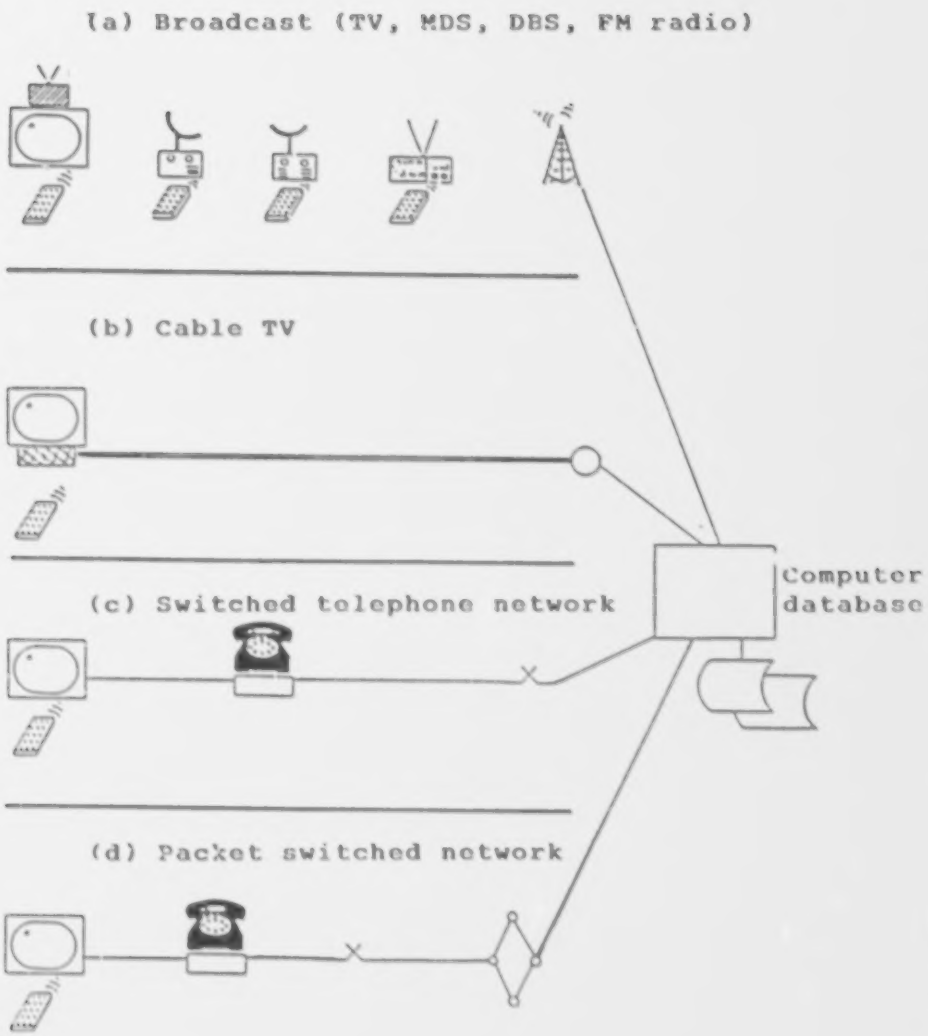
g) The Application Layer provides means for the application processes to access the OSI environment. The protocols of this Layer serve the end user by providing distributed information service, its management and system management.

To conclude this section of the handbook it must be stated that the existing standards allow the establishment of Videotex and Teletex services based on a variety of transmission methods and media. Included are public switched telephone networks (PSTN), public switched data networks (PSDN), leased circuit connections, private transmission media, public and private broadcasting services, public and private broadcast cable networks.

Paragraph 1.2.3 of the CCITT Recommendation S.100 - International Information Exchange for Interactive Videotex, states in this regard: "Different options are offered as a choice for the Administrations to implement their national services". Several of the technically feasible information transmission methods are schematically presented in the draving Fig. B-1.

Figure B-1.

Communication Networks
for Digital Information Transfer



B.2 The Competing Teletext Systems

Three distinct Teletext technologies from three different countries have been competing to achieve predominance in the North American market: the British, French and Canadian.

The British approach is a derivative of British Ceefax technology, developed jointly in 1974 by the BBC and a British software firm called LOGICA and operated commercially in England since 1979. In the British approach (the alphamosaic approach), the screen is divided into an invisible grid, and the transmitted signal instructs the decoder how to fill in each square, as if it were creating a mosaic.

The French competitor is Antiope technology, developed by Telediffusion de France. The French also choose alphamosaics, but with a slightly different approach to encoding the information being sent to the decoder.

The Canadian Telidon technology was developed by the Canadian Department of Communications. Here the decoder draws graphics by obeying geometric instructions transmitted to it. This approach is called alphageometrics.

The major operational differences in these technologies exist between the British Ceefax system and the other two services, whose standards are identical. Ceefax technology is generally considered less flexible than its competitors but alphageometrics requires a more sophisticated decoder than alphamosaics. The "defined format" of Ceefax provides for most of the Teletext signal processing at the head-end rather than at the decoder, whereas under the Antiope and Telidon "variable format" processing is concentrated at the decoder rather than the transmitter and the language is independent of the transmission system.

For graphics, Telidon technology is superior to the Antiope and current Ceefax system. Telidon is able to accommodate high-resolution alpha-geometric graphics while Antiope and Ceefax can accommodate only "block" graphics.

In the U.S. two proposed standards were delivered to the FCC in 1981: the United Kingdom Teletext Group proposed a standard based on the British Ceefax system and CBS and Telidon Videotex Systems proposed a standard which included new technology developed by AT&T, known as Presentation Level Protocol (PLP) for the coding of text, graphics and control information. AT&T interest is primarily in the Videotex area but PLP was designed to take into account the needs of Teletext since it is desirable for the coding of text and graphics to be compatible between Videotex and Teletext.

The Federal Communications Commission in the U.S. has refused to rule on a broadcast Teletext transmission standard, preferring to let market forces determine the standard.

The BBC is now embarking on the development of the fifth generation of Ceefax technology, designed to be compatible with the first, which is the one now operating in Britain. The fifth generation of Teletext can display pictures of photographic quality and transmit computerized data or software to specially equipped TV receivers. These Teletext computer programs, called "telesoftware", might prove to be an important development in the history of communications, transforming the home television set with an adaptor box into a specialized computer with capabilities now found in home computers. With the addition of telesoftware, broadcast Teletext emerges as an interactive medium.

B.3 The Competing Videotex Systems

In terms of presentation of text and graphic data, the technologies employed in Videotex services are the same as those used in Teletext. In terms of technical standards, the British have developed an entirely separate technology for Videotex, known as Prestel. Prestel was developed by the British Post Office in conjunction with a number of television set manufacturers and information providers. The original repertoire for Prestel was chosen to comply with that provided by conventional typewriters in the U.K., and to maintain compatibility with broadcast Teletext. It did not agree with the repertoire of characters used for data processing, and so was allocated a different set of codes for transmission. The British Ceefax technology, proposed for the U.S. is not applicable to Videotex.

Prestel technology and Antiope technology, both of which share the use of alpha-mosaic or block graphics, have been incorporated into a separate combined standard for Videotex in 26 European countries under the umbrella of the Conference of European Postal and Telecommunications Authorities (CEPT).

The AT&T-Telidon-Antiope Presentation Level Protocol (PLP) has been offered as the basis for a Videotex standard in the US as well as a teletext standard for the coding of text, graphics, and control information. PLP is emerging as the de facto North American standard and is referred to as such (NAPLP).

The fact that CEPT and PLP systems are currently incompatible creates barriers to the development of a worldwide standard, although, in the absence of plans for international transmission of Videotex, a worldwide standard does not seem to be necessary. CEPT representatives would prefer that the PLP standard be modified to be compatible with CEPT alpha-mosaics. If this can be done a worldwide standard could be proposed that incorporates both systems. Both AT&T and IBM are attempting to develop a technical solution that would allow for accommodation of number of different protocols including, presumably, the CEPT technology.

A comparison of the display characteristics of the competing Videotex technologies is presented in Table B-1.

Table B-1

Display Characteristics of
Competing Technologies

	Prestel	Teletel	CEPT (Bildschirmtext)	NAPLPS (SRM)
Attributes	Serial	Parallel	Parallel and Serial	Parallel
Screen Size	40 Chars x 24 Lines	40 x 24	40 x 24	40 x 24
Double Height	Yes	Yes	Yes	Yes
Double Width	No	Yes	Yes	No
Double Size	No	Yes	Yes	Yes
Colours	7	8	4096 Palette 4-32 Displayable	512 Palette 16 Displayable
DRCS	No	No	84-94 (1) Characters	96 Characters
Graphic Modes	Mosaic (2 x 3)	Mosaic (2 x 3)	151 Chars. Mosaic Smooth Mosaic Line	96 Mosaic 96 PDI
Textures	Disjointed Graphics	Disjointed Graphics		4 Defined Solid Vertical Hatched Horizontal Hatched Cross Hatched For User Defined
Blinking	1	1	16 Levels	16 Levels
Number of Characters	96	192	335	192 (96 DRCS)
Scrolling	No	No	Yes	4 Ways
Data Format (10 Bits)	7 Databits	7	8	7 or 8

Note 1 - CEPT DRCS may be composed of characters built in 12x10 dots, 60x10 dots, 6x5 dots, (96 chars. maximum) or in 12x12 dots, 6x12 dots, 6x6 dots (84 chars. maximum).

Note 2 - The number of colours displayable on any one screen depends on the DRCS used. For DRCS characters composed of 12x12 or 12x10 dots, only four colours can be displayed. Otherwise 16 colours may be displayed.

B.4 Future Trends

- Today's dumb terminals will be replaced by microcomputer-based devices.
- Single standard terminals will be replaced by multi-standard terminals.
- CRT displays will be replaced by flat-screen portable microcomputers.
- Minicomputer-based private Videotex systems will be replaced by microcomputer-based Videotex networks.
- Menu-driven information retrieval systems will be replaced by key-word and free-text searches.
- Videotex will become a standard communications and display protocol.
- Today's display standards will be replaced by alphageometric and then alpha-photographic displays.
- Equipment costs will fall drastically by a factor of 10 by mid-1990.
- Laser videodisc players will become part of the home entertainment system. Videotex will utilize them.
- Networks will become more intelligent and much faster (50k bit/sec over digital voice networks).
- Hybrid systems combining full channel Teletext and interactive Videotex will grow in acceptance.
- Satellite systems will grow in acceptance as reception dishes drop in price.

Appendix C

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Appendix D

Glossary of Terms

Adaptor -
The hardware and software required to modify a TV set or microcomputer into a Videotex terminal. Adaptors can be either separate units external to the TV set or integral with the TV or microcomputer.

Alphageometric -
The method of displaying alphanumeric characters and graphic shapes generated from transmitted geometric programmed instructions.

Alphamosaic -
The method of displaying alphanumeric characters and graphic shapes generated form a limited number of mosaic elemental shapes.

Alphaphotographic -
See "Picture Videotex".

Analogue -
The representation of numerical values by physical variables such as voltage or current, etc.

Antiope -
The French standard for character coding and display on Videotex terminals.

ASCII -
American standard code for information interchange used to describe the widely used teletype-compatible telex communications protocol.

Asynchronous -
Transmission of digital information in which each character is individually synchronized, usually by start and stop bits.

Baseband -
The signalling technology in which digital signals are applied directly to a medium.

Bildschirmtext -
The West German public Videotex service.

Bit -
A single binary digit; the smallest unit of storage in electronic systems.

Broadband -
The signalling technology providing multiple independent carrier channels on a single cable, by the use of multiple frequencies.

BTX -
Bildschirmtext.

Cable Networks -
Local networks linking homes, usually by coaxial cable, to provide TV programming service of improved quality or variety. They can also be used to support Teletext and Videotext services.

Cable TV -
TV networking linking television receivers to a head-end broadcasting station, usually by coaxial cable.

Captain -
The Japanese Videotex display technology and public service.

CCITT -
Comity Consultative International Telephonique and Telegraphique. Worldwide representative body of PTTs and telephone service operators.

Character Generator -
A method of displaying characters on a display screen, where the shapes of the characters are pre-defined and stored in the terminal's memory.

Circuit Switching -
The conventional telephone technique for establishing complete electrical paths between users at the outset of a call, and maintained during the duration of the call.

Coaxial Cable -
The cable used for high-frequency transmission, consisting of concentric rings of conductors and insulating material.

Connect Time -
The length of time a terminal is online to a computer system.

CUG -
Closed user group. A private data base on a Videotex system.

Cursor -
The pointer on a display screen that indicates the point or character position that is being addressed.

Data Compression -
Any technique that reduces the amount of digital information need to store and transmit voice, image and other data.

Datex-P -
The West German national X.25 packet-switched network service.

DBS -
Direct broadcast satellite. Satellite TV broadcasting direct to homes equipped with suitable antennae.

Display Attribute -
A parameter, such as colour, size, etc. to specify how a specific character or shape is to be displayed.

Dot Matrix -
Used to define a shape as a series of dots arranged in a grid (matrix).

DRCS -
Dynamically redefinable character set. A technique for changing the mosaic shapes used in Videotex during run time.

Dumb Terminal -
A computer terminal without (or with limited) built-in intelligence.

Edit -
To manually create or modify a Videotex page or frame.

Electronic Mail -
The electronic transmission of messages textual documents.

Facsimile -
Telecommunication products and services for transmitting document images.

Frame -
A screenful of information, used loosely as a unit of storage, in Videotex systems.

Full-Duplex -
Data transmission in both directions simultaneously.

Gateway -
The means whereby the user of a public Videotex service can gain access to external computers operated independently.

G-Set -
Graphic set of 96 characters.

Half-Duplex -
Data transmission in one direction at a time.

Head-End -
The operational centre of a cable TV service.

Hertz -
Standard unit for cycles-per-second. (Abbreviation-Hz). Used as a measurement of frequency in radio transmissions and telephones.

In-House -
Within an organization.

Interlacing -
In TV displays, the technique of interleaving two separately - transmitted fields in order to reduce flicker effects in the picture.

IP -
Information Provider.

ISDN -
Integrated Services Digital Network.
The name given to the new digital voice and data networks being planned and implemented by telephones and PTT's.

ISO -
International Standards Organization.

KB -
KiloByte - a Thousand bytes.

Keyword -
A word or number associated with a unit of information and used to retrieve that information. A form of data base retrieval involving searching for references to one or more words.

LAN -
Local Area Network. A high speed network operating a speed in the megabites/sec range, use to link computers and peripherals, usually within a single site.

Layer -
One of a series of layers that make up the network architecture in a modern computer network.

Leased Line -
A private (usually rented) telephone link between two fixed points.

Level -
See "Layer". Also used to describe the different display standards used in the CEPT standard.

LOG on/off -
The procedure for terminal users to initiate/terminate an on-line session.

Mail Box -
See "Store-and-Forward".

MB -
Mega Byte - One Million Bytes.

Menu -
Series of numbered choices displayed on a Videotex page or display screen.

Menu Selection -
A form of data base retrieval usually involving a hierarchical structure of index frames.

Microcomputers -
Low cost, small computers mainly for personal use.

Modem -
Modulater/demodulator. Equipment used to integrate digital equipment to an analogue transmission system, usually the telephone network.

MUPID -
An intelligent Videotex TV set adaptor.

NAPLP -
North American Presentation Level Protocol. (See "PLP"). Also referred to as NAPLPS.

Network Architecture -
The arrangement of layers and protocols in a modern computer network.

Network Topology -
Physical network arrangement.

NTSC -
National Television System Committee. Standard for colour television broadcasting in North America and Japan.

Off-Line -
Computing without telecommunications networks.

On-Line -
Computing associated with telecommunications networks. It may also be real-time.

Open System -
A system enabling a variety of different computers and terminals to work freely together.

Optical Fibre -
Very thin strands of glass fibre used in telecommunications. Electrical signals are converted into pulses of light and propogated down the glass strands with very little loss.

OSI -
Open System Interconnection. (See "Reference Model").

PABX -
Private Automatic Branch Exchange. The equipment providing switching for in-house telephone systems.

Packets -
Small assemblages of data that can be uniquely addressed for transportation over a data network.

Packet-Switching -
A technique for transmitting data packets through a network.

PAD -
Packet-Assembler-Disassembler. The interface point to a packet-switched network.

Page -
A collection of Videotex frames with the same page number. Often used loosely in place of frame.

PAL -
Phase Alternate Line. One of two European standards for colour television.

Parallel Attributes -
Display attributes, several of which can be varied from character to character in a Videotex display.

Parameters -
Formalized instructions for a program.

Password -
A secret identification number keyed by the user and checked by the system before permitting further access.

PDI -
Picture Description Instruction. Used in alphageometric Videotex displays.

Picture Videotex -
High resolution Videotex display technology enabling still images to be stored, transmitted, and displayed. Picture Prestel is the UK implementation of this technology.

Pixel -
An abbreviation for picture element from which TV pictures are created on the screen.

PLP -
Presentation level protocol. AT & T's Videotex standard. Telidon has now been modified to be compatible with PLP.

Port -
Access path into a computer system. For a Videotex system, the number of ports determines the number of simultaneous users of the system.

Prestel -
British TELECOM's commercial Videotex service, and the name of the corresponding network architecture and presentation scheme.

Protocol -
The rules governing how two pieces of equipment communicate with one another.

PSSN -
Packet-Switched Services Network. A public data network which usually uses the X.25 protocol.

PSTN -
Public Switched Telephone Network. The public dialled telephone network.

PTT -
Post, Telephone and Telecommunications. A postal and telecommunications authority.

Raster -
Set of television scan lines defining the TV picture.

Real-Time System -
An on-line computer system which processes inputs as they are received and immediately updates associated files.

Reference Model -
ISO's 7 layer model of open systems interconnection.

Relational Database -
A form of database technique, involving hierarchical information structures and easy-to-use enquiry languages.

Resolution -
For a display terminal, the number of picture elements into which the display can be resolved.

Response Frame -
A Videotex message frame specifically for handling messages from users to service providers or application programs.

RGB -
Red Green Blue. The direct interface to a colour TV set's guns.

Routing Page -
A Videotex index page, showing routes to other pages.

RS-232 -
The US equivalent to V.24, a data communications protocol.

Scan Line -
The horizontal lines of a TV display.

SECAM -
One of two standards for colour television broadcasting in Europe, and developed in France.

Separated Graphics -
An option with Videotex mosaic graphics where each of the blocked-in areas does not completely fill the sub-cell.

Serial Attributes -
Display attributes only one of which can be varied from one character position to the next.

Service Computer -
A computer centre with an information database available to Videotex users.

Service Provider -
Provider of information or services to a Videotex system.

Static-Frame -
Preformatted Videotex frames that are retrieved and displayed on command, rather than being generated on-the-fly.

Store-and-Forward -
Electronic messaging systems involving the intermediate storage of messages, for subsequent sending and/or retrieval.

System Operator -
The organization responsible for the overall running of a Videotex service.

Teleprocessing -
On-line computer processing mass-market service.

Teleshopping -
On-line shopping services which allow terminal users to place orders with suppliers.

Telesoftware -
The process of transmitting computer programs from a central point to remote computers over a telecommunications network.

Teletex -
Super-telex system, planned by European PTT's and other telephone administrations for the 1980s.

Teletext -
A generic term for one-way broadcast Videotex and information service.

Telidon -
The Canadian Department of Communications Videotex standard.

Transactional -
An on-line computer application involving direct interaction between users and computers in real-time.

Tree Structure -
Arrangement of a data base in a number of hierarchical levels, each lower level presenting information of increasing detail.

Twisted Pair -
Ordinary insulated wire, such as that used in telephone networks.

Umbrella Service Provider -
A service provider who creates and maintains Videotex frames for third parties.

VAN -
Value-Added Network.

VAP -
Videotex Access Point, the intelligent interface point on the French Architel Videotex network.

VBI -
Vertical Blanking Interval. The part of the TV transmission cycle at the end of a full screen most frequently used for teletext transmissions.

Videotex -
The term coined by the CCITT for broadcast (teletext) and interactive (Viewdata) text and image systems. Outside the UK, the term is usually applied to interactive Videotex.

Viewdata -
Interactive Videotex.

Wire Pair -
Same as Twisted Pair.

Wide-Area Networks -
A loose term for long distance telecommunication networks, in contrast to local area networks.

Workstation -
A generic name for a business terminal, usually an intelligent terminal.

X.21 -
The CCITT circuit switched network protocol.

X.25 -
The CCITT packet switched network protocol.